OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

July 23

JULY 9, 1951
VOLUME 40, No. 14

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY • BLEACHING • DYEING • PRINTING • FINISHING

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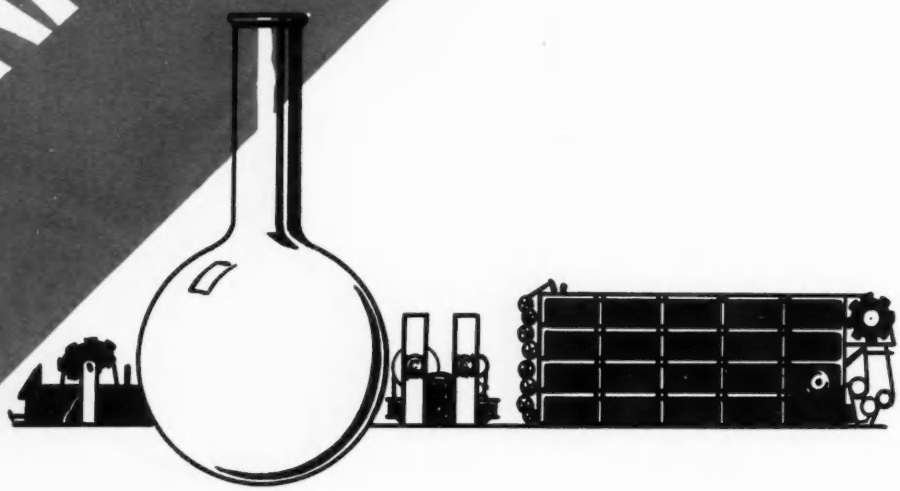

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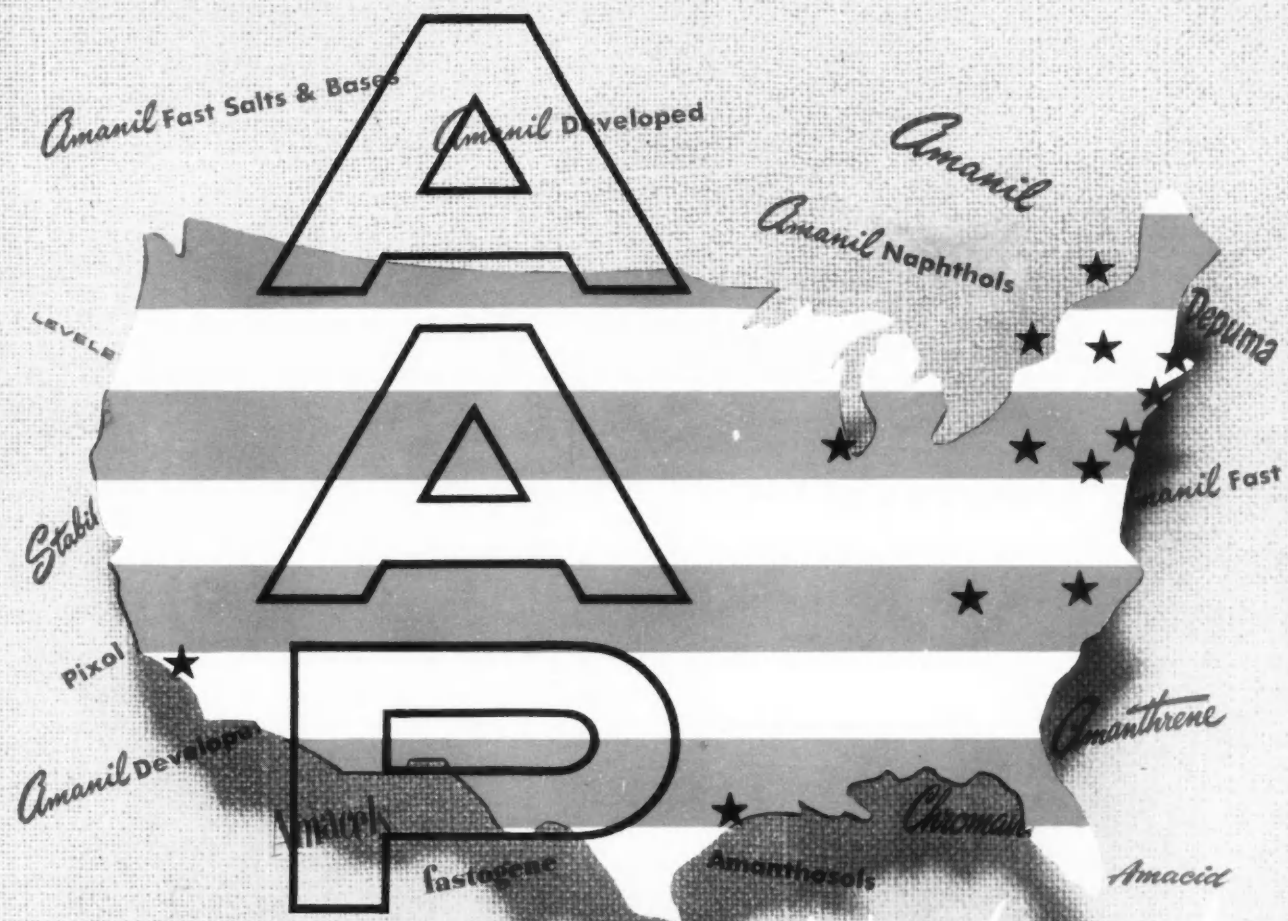

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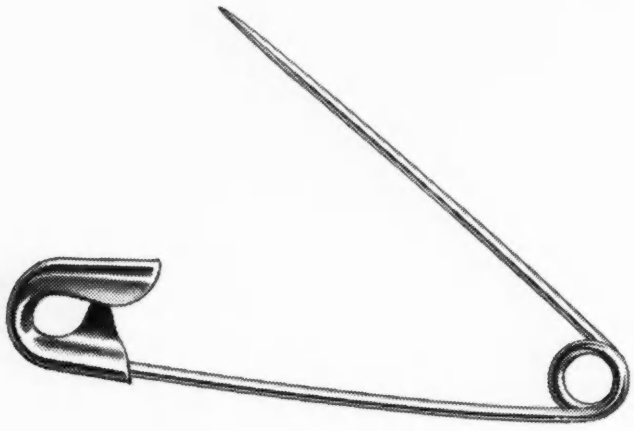

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	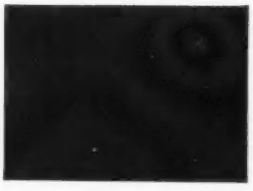	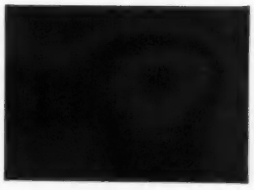

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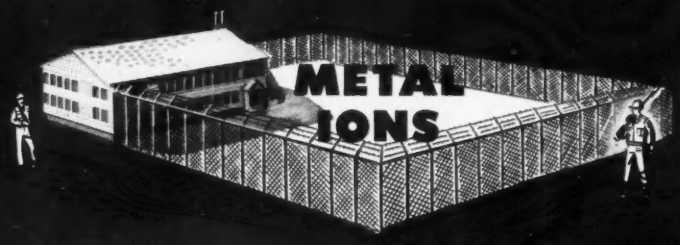

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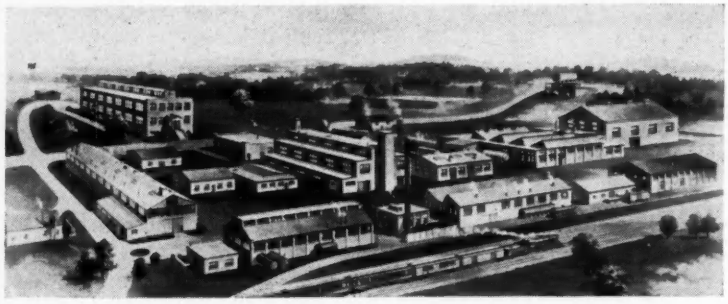

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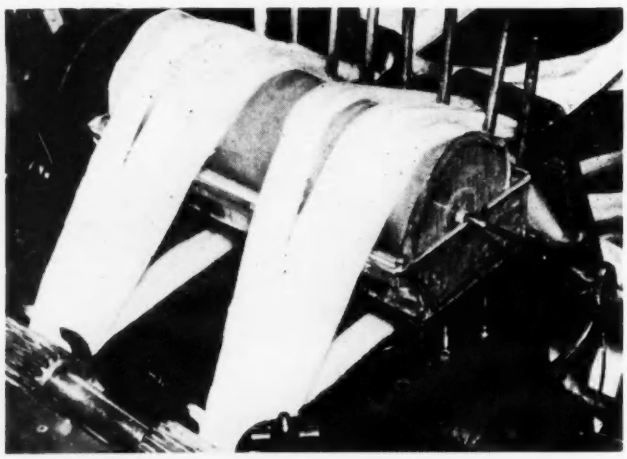

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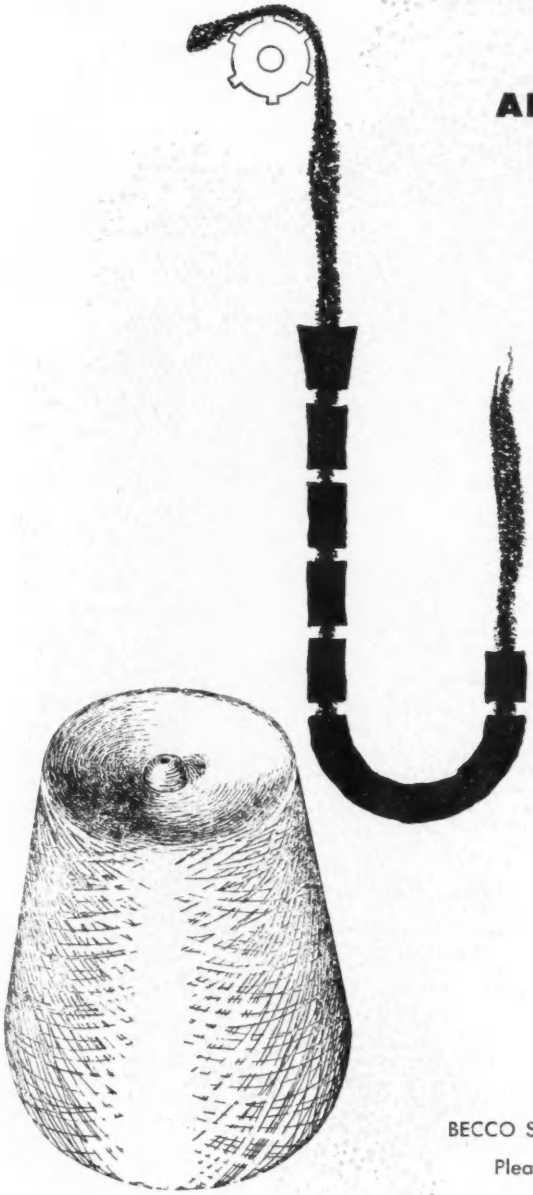

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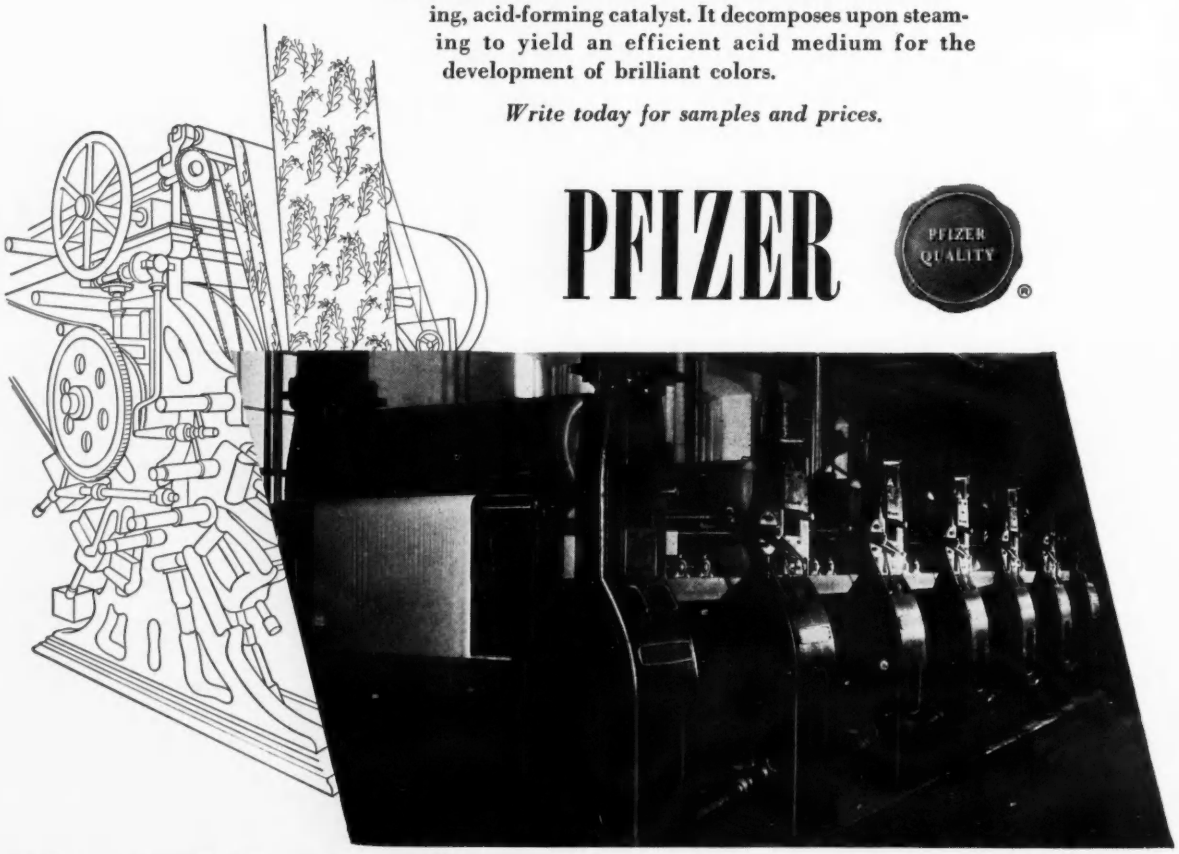

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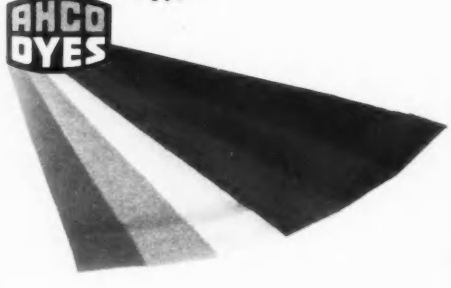

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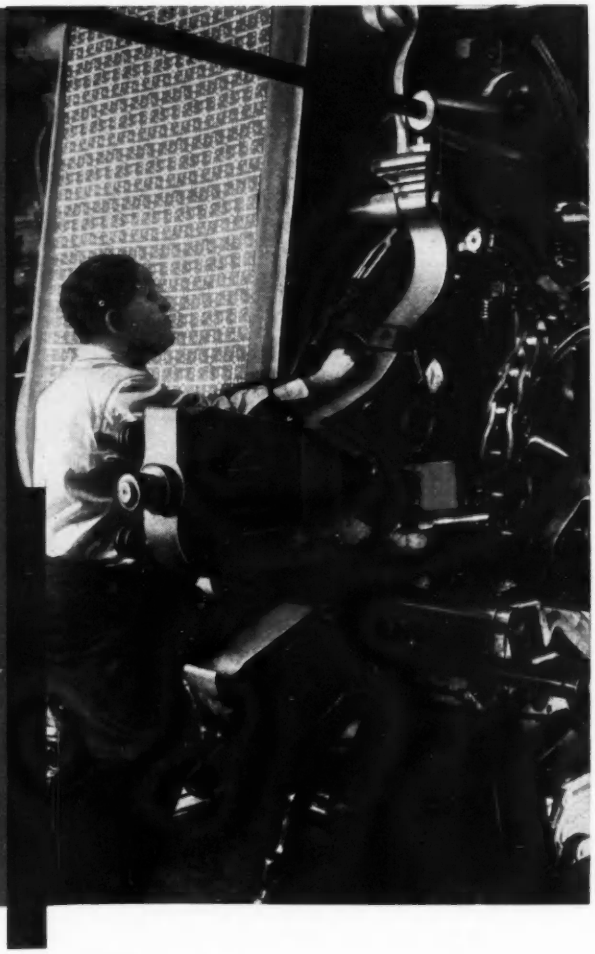

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VOLUME 40 NUMBER 14

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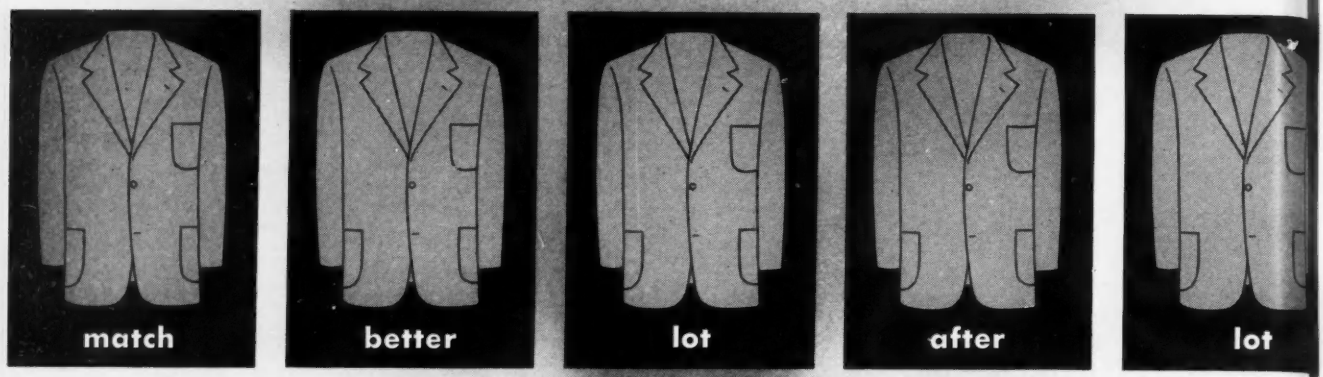

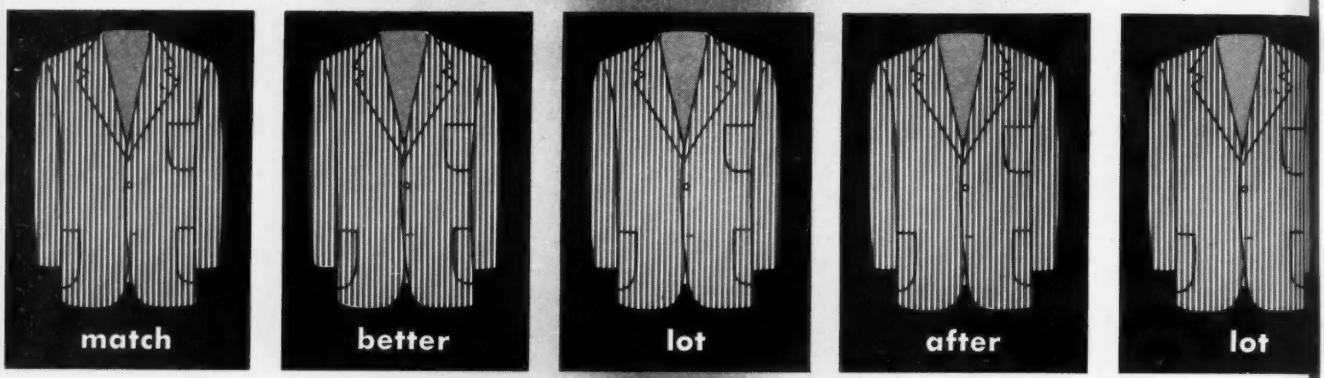

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AMERICAN
DYESTUFF REPORTER

VOLUME 40 JULY 9, 1951 NUMBER 14

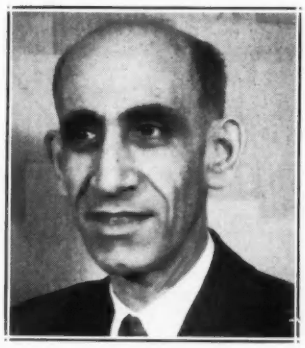
DETERMINATION OF THE STRENGTH OF DYEINGS

I H GODLOVE

General Aniline and Film Corporation
Central Research Laboratory
Easton, Pa

STRENGTH, one of the dyer's three variables, is originally and ideally equivalent to concentration of dyestuff on the textile fiber. In actual practice, however, it is a subjective estimate, made visually, as judged by related variables which change when concentration changes. That its determination is subject to fairly large errors under certain conditions has been pointed out several times and known for many years.

A study of the accuracy of visual judgments, made by C Z Draves in 1927 *(1)*, found that colorists may disagree by as much as 5% when there is no shade (hue) difference between sample and standard. As shade differences increase, judgments vary more and more until finally the colorists and dyers very sensibly refuse to state any estimate at all. E I Stearns, in a recent article *(2)*, states that, in general, strengths can be estimated from a single set of dyeings to the nearest 5%. Imperial Chemical Industries workers *(4)* state that the accuracy of visual strength determination is 2.5-5%. In certain cases, and when one or two dyeings of the sample are compared with two or three standards (e g, spaced 10% apart in strength), the errors can be reduced and the reproducibility be made as good as 2%. In work undertaken in the standardizing departments of dyestuff producers, where the whole history of the formulation, "shading," dilution and mixing of the dye lot is known, uncertainty as low as 2% is undoubtedly reached in the majority of cases. The director of a great laboratory once told the author that his company gave its customers, on the average, about 0.5% more dye than they paid for, in order to be on the "safe side". In some textile mills, however, where accurate formulations are relied upon, variations of strength upwards (if not accurately known) are about as bad as variations downward.



I H Godlove

Reviewing and commenting generally on several published works relative to practical methods of dye strength determination, the author employs them in an analysis of the subjective process of evaluation of the objective variables determined with the aid of the spectrophotometer, as part of a program that also investigates dyers' brightness and shade.

Following this Dr Godlove turns to a discussion of the "more objective bases" for evaluation of strength directly from instrument measurements, i e, purity and reflectance, citing three reasons for a switch from Munsell chroma and Munsell "value". Following this, he develops a simple method to serve in cases where a spectrophotometer, and especially an automatic integrator, is available.

There are at least two other practical methods of dye strength determination: titration, as with titanium chloride, and measurements with a spectrophotometer. The earliest comparative studies of the three methods were published by C Z Draves in 1928 *(3)*. He found that of 918 dye lots, nearly half of the spectrophotometric determinations agreed with visual ones within 2%, 29% of them agreed within 2-3%, 10.7% agreed within 3-4%, and only 1.6% deviated from the visual results by as much as 10%. The spectrophotometer available to him in 1928 was a visual one, not an accurate, photoelectric one, and it was especially uncertain in measuring yellows and oranges. Further, since variations are well known in visual judgments, and he found greatest deviations of instrumental from visual strengths when shade (hue) differences were greatest (where the eye has most difficulty), it seems probable that a large part of the difference between the two methods was due to errors in visual judgment. Moreover, probably the large deviations were with dyes that exhaust poorly onto the fiber or change color during dyeing, so that the concentration of dye on the fiber differed materially from that in solution. Nevertheless in practical work, which must satisfy the dyestuff consumer who must get his dyeing right, the eye must be taken as right, and the instrument as wrong when there is a difference between the two. Of course, there are often cases where the user of the dye may want to know the true dye concentration, regardless of what it may become in a particular dyeing.

Draves, in 1928, stated that the average deviation in strength determination with his spectrophotometer was 0.5%, thus definitely better than could be obtained visually (2-5% or worse). He further stated that on 80 lots, where the deviation of spectrophotometric strength from dyeing strength averaged 3%, titanium titration deviated by 6.6%, or more than twice as much. With the accurate spectrophotometers available today, these differences would still further favor the spectrophotometer. And in the cases where poor or

variable exhaust causes large differences between instrument and dyetests, the instrument can also be applied to study the exhaust liquors and to apply corrections.

The next work of special interest on this subject was done in the laboratories of Imperial Chemical Industries in 1943 *(4)*, where a study of the visual or subjective judgments of strength and their relation to the objective quantities capable of measurement, including the amount of total dye strength known from the formulations, was made. In particular, 8 dyeings, dulled by replacing 2, 4, or 6% of the dye by an equivalent amount of gray dye, were studied. The gray made the reds and greens darker, the blues lighter. Twenty-six colorists and twelve less experienced noncolorists judged the strengths, using standards differing in 5% steps. Of the 26 colorists, 8 were considered especially expert, and their results were separately averaged.

As compared to undulled standards called 100%, the dulled dyeings (also containing 100% total dye) were judged by the 8 experts to vary in the 8 dyeings from 89 to 97% in strength; by the other 18 trained colorists, from 91 to 97.5%, and by the noncolorists from 91 to 104% strength. On the average, the experts were about 7% off, the other colorists 6% off, and the noncolorists 4% off. That is, *all 38 had mistaken some dullness for strength, but the least experienced group were least disturbed by the grayness.* A possible reason for this surprising result will be seen presently. On the other hand, *the "experts" were more consistent* than the less experienced colorists and noncolorists whether the dyeings were grayed or not. Similar facts have been found in this laboratory by my colleague, Hugh R Davidson.

The ICI workers went on to analyze their data to see what the objective bases of the subjective (visual) judgments were. The colorists' and noncolorists' judgments, and estimates that can be obtained from two different quantities, both calculable from spectrophotometric measurements, were all compared with the known amount of colored dye content. The two instrumental quantities referred to are known as "excitation purity," which is related to dyer's "brightness," and reflectance, which is closely related to the lightness or darkness. We will abbreviate "excitation purity" to "purity." For a red dyeing containing 4% gray and 96% "colored" dye, the colorists averaged 92%, which is in the direction of the 82% that would be estimated if their subjective judgment were entirely based on equal purities of sample and standard. The noncolorists averaged 101%, which is in the direction of the 120% that would be estimated if their judgment were entirely based on the reflectance (interpreted subjectively as lightness).

In this case at least, and probably in general, neither colorists nor less experienced persons judged the strength of dulled dyeings solely on the basis of purity or reflectance; however, the colorists were found to depend primarily on purity, while the less experienced persons depended primarily on reflectance, which is often more easily perceived for a given change of concentration. Presently we shall go into these questions in more detail; but we may state the belief here that there is much truth in these findings.

We have not dwelt upon the explanation of this case and similar ones because it has been reviewed in an article by E I Stearns *(2)*. Stearns also pictured graphically how the visual correlates of purity and reflectance change as the strength of dyeing is increased. He pointed out, by spectrophotometric curves, why it is more difficult to judge the strength of yellows than to judge other hues. (We shall do this in a different way). He also showed how the situation is improved by small additions of a blue dye before judging the strength of yellows. By means of two idealized or hypothetical spectrophotometric curves, one for a gray, he showed that a given small change (1% in reflectance level of a horizontal curve) is more easily perceived when it produces a shade (hue) difference than when it makes the color lighter or darker. He also pointed out that "strength" depends enormously on the fiber onto which the color is dyed. After reviewing some of the ICI work and some other interesting points, he turned to evaluation of strength with a spectrophotometer, combined with one of several formulas that have been proposed for interpreting the measurements to concentration. The formulas of Pineo, Nutting, Preston and Tsein, Selling and the important "K/S" method of Kubelka and Munk employed so much in the paper trade, were reviewed (see Stearns' article for references). It was found that, except for very low dye concentrations on wool, the simpler Selling formula agrees well with the Pineo formula. Presently we shall state a method, which is simpler to apply than any of these formulas and may be sufficiently accurate in most cases.

In a joint paper *(5)* on applications of Davidson's Tristimulus Integrator combined with the Hardy-GE Recording Spectrophotometer, some data on the performance of four very expert colorists were presented. The colorists made repeated independent judgments of shade, brightness and strength of red, green and blue dyeings; and also judged whether they were an "acceptable match" to standard. *In all cases there were contradictory judgments,* both by single colorists and by different ones. If the dye bath were to be corrected on the basis of the judgment of one expert, it would be done differently on another expert's judgment. Also in this paper the meaning of dyer's "brightness" and strength are represented in terms of the quantities calculated automatically by the Tristimulus Integrator from measurements with the spectrophotometer. In a paper by the same authors *(6)*, "Control of the Dyebath by Means of Spectrophotometric Measurements", it has been shown how a dyebath with yellow, red and blue component dyes may be controlled to yield constant strength as well as constant shade and brightness. A very recent paper by Davidson *(7)* has given much more detail concerning the performance of experienced colorists and less experienced persons in judging the three variables of color. He has throughout his work employed a convenient empirical method of converting instrument measurements and the color-scientists' three visual color attributes to strength, shade and brightness as used by the dyer.

In another recent article, H Cikurel *(8)* tried to show that equal steps can be obtained visually in a series of dyeings at increasing strengths, if the dye strengths of a single dye are increased logarithmically rather than arithmetically. By "logarithmically," we mean, for example, doubling the dye strength for each successive visual step, or increasing it in some constant ratio. In attempting to show this, Cikurel applied the Weber-Fechner law of the psychologists to relate visual steps logarithmically to dyeing strengths. It was later pointed out *(9)* that Cikurel did not go far enough, dealing with only two of the three quantities involved (strengths, reflectances and visual steps), tacitly assuming (in error) that dye strengths and reflectances are proportional. This assumption is in general not true; and also, the Weber-Fechner law is only an approximation to the truth. A better relation between dye strengths and reflectances, with strength not merely proportional to reflectance, is furnished by the "K/S" formula of Kubelka and Munk *(10)*, by one of the others reviewed by Stearns *(2)* or by that given below. However, reasons were given *(9)* to show that Cikurel's assumption might lead to not too much error to make approximately correct the "logarithmic" relation to dye strengths. In fact, a successive doubling relation was often actually found in the dye-strength formulations used by Davidson to get the visually-equal steps of the Munsell system of colors. In other cases, however, this relation did not hold, so that the indicated possible errors must have been appreciable in these.

Davidson noted, in work of this nature using dyeings on wool, that Munsell "chromas" (related to dyer's brightness)

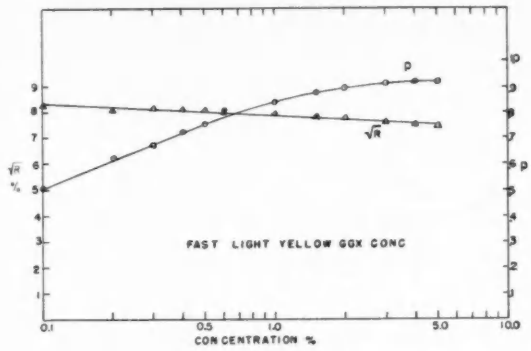


Fig 1

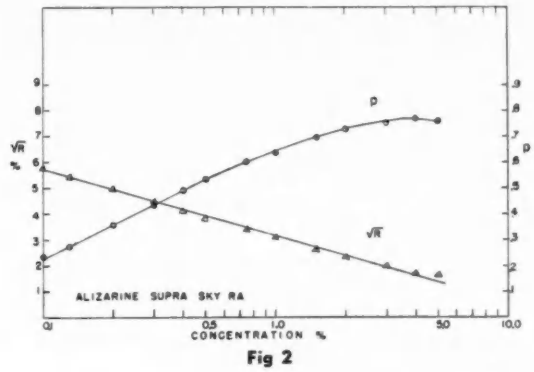


Fig 2

of strong dyeings often did not continue to increase as the strengths (concentrations on the fiber) were increased. This had been previously pointed out for pigments by W D Wright (among others), quoting D L Tilleard *(11)*. In both pigments and dyes, the curve of Munsell chroma for increasing strength may "double back" on itself, so that there may be *two* values of strength corresponding to certain given values of Munsell chroma (or purity). If an expert colorist subconsciously judges strength primarily on the basis of purity, the more objective correlate of subjective chroma, as the I C I chemists say they do, he might be uncertain as to which of the two possible strengths thus indicated was present. He must be assisted by the objective basis which the less experienced I C I observers used, namely the reflectance variation, which in most cases is more easily seen. Probably he is often helped somewhat too by hue variations with concentration, particularly in yellows and oranges, where he needs help most, incidentally. It is evident that the judgment of strength is a complex and an intricate art, a fact made clearer in what follows.

For three reasons we turn from Munsell chroma and Munsell "value" (lightness) to more objective bases for evaluation of strength from instrument measurements, namely, to purity and reflectance. First, the process of judging strength is a subjective evaluation of objective realities, the properties of a dyeing, which are presented to the eye and measured by instruments. Second, it was noted that curves of purity versus dye concentration, the latter being plotted logarithmically, exhibited less curvature and barely any of the "doubling back" found in chroma versus strength curves; also "curves" using square-root of reflectance were slightly nearer straight lines than those using Munsell "value" or lightness, which I C I and Davidson used. Third, the reflectance is directly and immediately read off the Tristimulus Integrator (the tristimulus value Y), needing no conversion to "value" or lightness; and purity may be read off more quickly from graphs *(12)* of tristimulus values reduced to percentages, than Munsell chroma may be obtained.

Figures 1 and 2 give the relation of square-root of reflectance ($\sqrt{R}$) and purity "p" to dyestuff concentration plotted on semilogarithmic graph paper for a typical yellow and a typical blue dye. Colors of other shade (hue) would be of intermediate character. Several facts are immediately noticeable:

(1) the unambiguous straight-line character of the $\sqrt{R}$ "curves";

(2) the only slight curvature in the curves with purity "p" as one variable in strengths from 0.1% to 5%;

(3) the slope of the yellow—this is so small that surely here (and in most other yellows) no reliance can be placed on it in judging strength; the $\sqrt{R}$ versus conc slope of the blue is sufficient that an experienced colorist might readily build up a mental correlation between its reflectance and concentration.

In Figure 3, the slopes of the square-root-of-reflectance curves, measured by the difference between a 0.2% and a 2% dyeing, are plotted against the shade (hue) of 26 dyeings. It is seen that from greenish yellow to yellowish red the slopes increase. From bluish red through purple and blue to blue-green *the slopes are nearly constant.* This simplifies the visual remembrance of the relation between reflectance and concentration. If other dyes (which will be studied) do not fall too far off this curve, we might with fair accuracy *predict* the slopes of dyes not yet studied on wool, and determine all strengths, within reasonable limitations, very simply from a single measurement of reflectance of a dyeing of known strength. If we suspect, as from the shapes of the spectral-reflectance curves or from previously published data, that the dye may give a slope very different from the curve of Figure 3, we need merely to determine the slope from a measurement of reflectance at *two* known dye strengths. More accurately following the colorist's method of judging would be a method combining the reflectance with the purity curves, using an average weighted by the slopes. This step has not yet been taken in much detail; and perhaps others may be interested in investigating this possibility.

The author does not wish to urge the general use of this method as a practical one for dyeings on all fibers, nor beyond the range of concentrations plotted in the graphs of Figures 1 and 2. It is well known that the relation between reflectance and concentration varies with many factors, including the nature of the dye and the fiber and the type of dyeing. The several constants in the Pineo and some

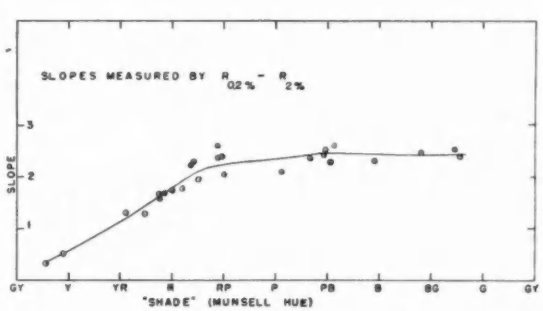


Fig 3

other formulas are an expression of this complexity. But there are many cases where the simple method described here may serve very well when a spectrophotometer, and especially an automatic integrator, is available.

However, the primary object of the author here has been the analysis of the subjective process of evaluation of the objective variables determined with the aid of the spectrophotometer, as part of a program that also investigates dyer's brightness and shade. It is clear that, while the I C I workers discovered much of the truth in connection with strength, it was not completely revealed by their work, for apparently no colorist could rely upon the small reflectance change of typical yellows. The purity, and especially curves with its correlate chroma as a variable, lead to too much uncertainty and confusion, if relied upon at high dyeing strengths. There must be even more combination of these objective bases in the subjective evaluations of colorists than even the I C I chemists realized in their excellent studies. It also seems clear that a given observer, colorist or noncolorist, must sometimes rely on reflectance, sometimes on purity, often if not nearly always on both, even for a single dye.

Data of the nature discussed here makes one wonder how the colorist succeeds as well as he does and leads to increased respect for him.

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THE INFLUENCE OF UREA AND MELAMINE RESIN FINISHES ON THE MECHANICAL PROPERTIES OF COTTON FIBERS*

R AENISHAENSLIN

GENERAL REMARKS

IN MODERN finishing techniques visual or superficial assessment of results is being supplemented to an increasing degree by measurements. Innumerable testing methods have already been worked out in an effort to establish fixed standards to cover the various fields of textile finishing. Certain difficulties are still being encountered, however, in the standardization of methods for testing formaldehyde-amino resin finishes.

As formaldehyde-amino resins and, above all, urea and melamine products are capable of producing completely different effects and secondary effects according to the type of precondensate used, three marketed products were tested.

For the purpose of these tests bleached, unmercerized cotton fabric with a weight of 140 g/sq m was used. From the wide selection of resin precondensates which are cured by heating, the following were chosen: a water-soluble dimethylol-urea in powder form (DMU), a dimethylolmelamine in powder form which is soluble in cold water (DMM), and a syrupy, water soluble methylolmelamine methyl ether of 73% solid content (MME). The baths were set at 100 g/l solid content, and 5 g/l ammonium chloride was added to each as a catalyzer immediately before use. The working temperature was 25°C and the impregnating effect 70% (calculated on the weight of the dry fabric). After impregnation the test samples were dried for 30 minutes at 60-70°C. One third of each test sample was cured for 10 minutes at 120-130°C and one third for 20 minutes at the same temperature.

In order to ascertain possible lasting damage to the fiber, stripping tests were made on untreated and treated material in which N/50 hydrochloric acid was allowed to act on the material for 30 minutes at 90-95°C in a liquor ratio of 1:50.

In order to determine the effects of the finish, the angle of crease and swelling value were measured. The first is expressed in degrees measured on the inside of the angle and the latter is calculated on the percentage of water absorbed, the amount of water absorbed by the untreated fabric being considered as 100%. The measurement of strength had to be limited to the determination of tensile strength and the resistance to abrasion, the untreated material also serving as the 100% standard in this case. The abrasion was calculated on 650 brush strokes.

These results (see table) show that

(1) too long a curing is detrimental to crease-resist and antiswelling effects;

(2) the greatest loss of strength is to be observed in goods finished with dimethylol-urea;

(3) the crease-resist and antiswelling effects are approximately equal in the case of all three resins.

The question as to why such a marked lasting weakening of the fiber should result only when urea resins are used, cannot be answered with any degree of certainty. We surmise that the very weakly basic urea resins are unable to buffer the excess of catalyzer whereas the more strongly basic melamine resins are obviously able to do so.

	Angle of crease (degrees)	*Swelling value (%)*	*Tensile strength (%)*	*Stability to abrasion (%)*	*Tensile strength (%) after stripping with N 50-HCl*	*Stability to abrasion (%) after stripping with N 50-HCl*
untreated	70	100	100	119	90	88
not cured	95	88	96	79	90	88
DMU 10 min 120-130° C	125	58	51	12	57	46
20 min 120-130° C	123	60	48	18	50	38
not cured	113	71	104	107	97	100
DMM 10 min 120-130° C	130	59	81	87	94	101
20 min 120-130° C	125	58	75	46	94	98
not cured	80	74	90	90	92	99
MME 10 min 120-130° C	130	52	61	22	86	98
20 min 120-130° C	128	60	68	45	93	95

* Reprinted from *Ciba Review*, No 84, February, 1951.

Proceedings of the

American Association of Textile Chemists and Colorists

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Calendar of Future Meetings

COUNCIL: Oct 18 (Hotel Statler, N Y); Nov 16 (Hotel New Yorker); Jan 18, 1952; April 18, 1952; June 20, 1952; Sept 19, 1952 (all in New York); Nov 6, 1952 (Boston).

GENERAL RESEARCH COMMITTEE: (Same dates and sites as Council).

NATIONAL CONVENTIONS: 1951—October 17-19, Hotel Statler, New York, N Y; 1952—November 6-8, Boston, Mass; 1953—Sept 17-19, Hotel Stevens, Chicago, Ill; 1954—Atlanta, Ga.

HUDSON-MOHAWK SECTION: Sept 21 (Jack's Restaurant, Albany); Oct 26 (Hotel Utica, Utica N Y); Dec. 7, Feb 1, 1952, Mar 21, 1952, May 2, 1952 (all at Jack's Restaurant); June 20, 1952 (Annual Outing).

MID-WEST SECTION: Sept 29 (Morrison Hotel, Chicago, Ill.)

NEW YORK SECTION: Sept 28 (Swiss Chalet, Rochelle Park, N J); Nov 30 (Swiss Chalet); Jan 11 (Hotel New Yorker); Feb 29 (Hotel McAlpin, New York); April 18 (Swiss Chalet); May 16 (Swiss Chalet); June 20 (Outing).

NORTHERN NEW ENGLAND SECTION: Oct 26 (LTI, Lowell, Mass); Nov 30 (Annual Meeting, Boston, Mass).

PACIFIC SOUTHWEST SECTION: Aug 3 (Nikabob Restaurant, Los Angeles, Cal); Oct 6 (Annual Outing, Ojai Valley Inn, Ojai, Cal); Jan 11, 1952; March 28, 1952.

PHILADELPHIA SECTION: Sept 14, Oct 26, Dec 7, Jan 18, 1952 (all at Kugler's Restaurant, Philadelphia).

PIEDMONT SECTION: Sept 22 (Annual Meeting, Charlotte, N C).

RHODE ISLAND SECTION: Oct 26 (Providence Engineering Society; Nov 16 (Johnston's).

SOUTH CENTRAL SECTION: August 24-25 (Outing); Dec 1 (Hotel Patten).

SOUTHEASTERN SECTION: Sept 8 (Columbus, Ga); Dec 8 (La Grange, Ga).

Preliminary Notice

30TH NATIONAL CONVENTION

American Association of Textile Chemists and Colorists
Hotel Statler - New York City - October 17, 18, 19, 1951

Auspices of New York Section

THE New York Section will be host to the 30th National Convention of the AATCC on October 17, 18 and 19, 1951, with headquarters at the Hotel Statler, New York City. It is the conviction of the Committee, based on preliminary surveys, that this Convention will be the largest in the history of the Association, both in scope and attendance.

The 30th National Convention will be marked by a number of "firsts":

It will mark the first time that technical papers will be presented by students;

It will be the first time for presentation of the American Dyestuff Reporter Award;

It will be the first time that exhibits will be presented on such a large scale, under professional management;

It will be the first time that an industry symposium will be held;

It will be the first time that the Convention will be held on Wednesday, Thursday and Friday.

PROGRAM

The program for the Convention has been set tentatively as follows:

Wednesday, October 17

Morning—Council Meeting
Afternoon—Two Technical Sessions

Thursday, October 18

Morning—Textile School Student Papers
Luncheon—Special Speaker, followed by
Afternoon—Industry Symposium

Friday, October 19

Morning—Two Technical Sessions
Afternoon—Intersectional Contest
Evening—Annual Banquet

The technical sessions will cover printing, dyeing, testing and auxiliaries, and finishing. Papers presented by the students will represent winners of local contests in various areas. The industry symposium will be an outstanding event for members as well as the industry represented in the New York area. For the first time in recent years there will be only one banquet at this year's Convention. This is in line with the voting on the Convention questionnaire sent to all members last year. There appears to be more interest in the Intersectional Contest and two sections have already completed their papers.

EXHIBITS

The exposition, under the management of Campbell-Fairbanks, Inc., will be the largest ever sponsored by the Association. More than 100 manufacturers of chemicals, plant and laboratory equipment, fibers and fabrics, will exhibit their products. Exhibits will be set up on Tuesday, October 16th, and show hours will be from 10 am to 10 pm on Wednesday and Thursday and from 10 am to 5 pm on Friday. The exhibit will be open to the trade without payment of registration fee and special invitations will be issued to certain groups.

HOTEL RESERVATIONS

Rooms have been set aside at the Statler, New Yorker, Governor Clinton, McAlpin and Martinique. Reservations may be made only through the Registration Committee and an application for this purpose will be sent you about the first of September. No suites will be available at the Statler but a limited number of rooms for entertainment will be available to *exhibitors only.*

LADIES ENTERTAINMENT

Plans are being formulated for the special entertainment of ladies attending the Convention although they are, of course, invited to attend any of the regular functions.

FINAL NOTICE

A final notice will be sent to you about the first of September at which time complete details regarding the program, hotel reservations, transportation, registration, dinner tickets etc will be given.

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THE PROBLEM OF DYEING WOOL IN MIXTURES WITH OTHER FIBERS*

HANS LUTTRINGHAUS
General Dyestuff Corporation

APART of the woolen industry has always made use of fibers like cotton or rayon to produce less expensive articles. Although mixtures of wool and cotton might have advantages for certain purposes, the main reason for their manufacture is based on the fact that cheaper fabrics are obtained. When we discuss wool in mixtures with other fibers today, we shall not spend any time with these well-known union fabrics, but rather shall devote our attention to more interesting and less known mixtures.

Newer fibers are mixed with wool, partly because of their lower price, but also because some definitely improve a woolen article. The advantages of some mixtures are so striking that woolen or worsted mills that would not use any other fibers previously have now gone into production with some mixtures and are experimenting with others. If, at the present high price and scarcity of wool, such fibers can be of help to the manufacturer and the consumer, a great deal will have been accomplished.

VICARA

First we shall discuss blends of wool and Vicara. Vicara is a zein fiber made by the Virginia Carolina Chemical Corporation. As a protein fiber it can be dyed with those dyestuffs which exhaust on wool. However, this is true only in a very general way. As soon as manufacturers of a new fiber have a sizeable production, the dyer is confronted with new problems. He soon finds that his old formulations are no longer valid, and he has to rely on the laboratory research of dyestuff companies if the mill laboratory is not equipped to solve such problems. The affinity of many acid and chrome dyes is very different for Vicara, and it is possible that, instead of uniform shades, very undesirable two-tone effects may be obtained. For knitting yarns, selected acid dyestuffs are usually satisfactory, and we shall mention here a few combinations that have given satisfactory results on mixtures of 50% Vicara and 50% wool.

It is rather difficult to describe a shade in such a way that another person can visualize its hue, depth and brightness. For the benefit of those interested in such dyeings, we have determined for these shades the corresponding Munsell notations to eliminate any ambiguous description.

The measurements of these shades were made with a spectrophotometer with Tristimulus Integrator attachment. In each case the Munsell notation is given with the formulation.

Hans Luttringhaus

In this paper the dyeing of the following mixtures is discussed: wool-Vicara, wool-nylon, wool-Orlon A3 staple fiber, and wool-Dacron.

Formulations for wool-Vicara blends are given, wherein the shades are identified by Munsell notations. Difficulties in dyeing the above blends are analyzed, and suggestions are given for a successful solution of the problems that may be encountered.

While Orlon cannot be dyed in the presence of wool, a list of dyestuffs is given for the dyeing of Orlon alone.

The possibility of dyeing mixtures of wool and Dacron is indicated, and a new dyeing method for Dacron is announced.

SOLID SHADES ON 50-50 MIXTURES OF WOOL AND VICARA

Brown: 4.0 YR 1.6/1.9
1.60% Fast Light Yellow GGXN Conc
0.74% Azo Phloxine GA Extra Conc
0.70% Alizarine Blue SAE

Brown: 4.5 YR 2.5/5.2
1.80% Fast Light Yellow GGXN Conc
0.56% Azo Phloxine GA Extra Conc
0.22% Alizarine Blue SAE

Red: 8.0 R 2.3/9.3
2.40% Azo Phloxine GA Extra Conc
0.70% Supra Light Rubine BLA
0.12% Fast Light Orange GA Conc
0.054% Alizarine Blue SAE

Red: 6.8 R 3.2/12.8
1.60% Azo Phloxine GA Extra Conc
0.46% Supra Light Rubine BLA
0.51% Fast Light Orange GA Conc

Green: 2.2 G 3.9/9.2
2.00% Alkali Fast Green 10 GA Extra
0.40% Fast Light Yellow GGXN Conc

Green: 3.4 G 2.3/6.0
1.40% Fast Light Yellow GGXN Conc
0.82% Alizarine Blue SAE
0.40% Naphtalene Green V Extra Conc
0.04% Supra Light Rubine BLA

Pink: 10.0 RP 6.0/6.6
0.16% Alizarine Rubinol R

Pink: 8.8 RP 4.0/9.9
0.20% Azo Phloxine GA Extra Conc
0.014% Alizarine Blue SAP
0.040% Fast Light Orange GA Conc
0.180% Azo Fuchsine 6 B New

Yellow: 5.0 Y 7.6/7.1
0.160% Fast Light Yellow GGXN Conc
0.004% Fast Light Orange GA Conc

Yellow: 4.5 Y 7.6/8.0
0.16% Fast Light Yellow GGXN Conc
0.008% Fast Light Orange GA Conc

Fuchsia: 6.4 RP 2.8/9.6
0.50% Azo Phloxine GA Extra Conc

* Presented in Albany, N Y, before the Hudson-Mohawk Section on December 8, 1950.

0.04% Acid Violet 4 BLD
0.20% Azo Fuchsine 6 B New
0.50% Violamine RD

Blue: 7.5 B 5.7/2.1
0.013% Fast Light Orange GA Conc
0.030% Alizarine Blue SAP
0.500% Fast Light Yellow GGXN Conc
0.080% Alkali Fast Green 10 GA Extra

Blue: 5.7 PB 1.6/6.2
1.50% Alizarine Blue SAE
0.24% Acid Violet 4 BLD
0.12% Supra Light Rubine BLA
0.10% Fast Light Yellow GGXN Conc

Blue: 8.2 PB 1.0/5.2
3.00% Cyanthrol RXO
0.50% Fast Acid Red E

Blue: 9.5 B 3.4/5.6
0.03% Supra Light Rubine BLA
0.025% Fast Light Yellow GGXN Conc
0.560% Alizarine Blue SAP

Blue: 8.0 PB 1.1/3.1
2.50% Alizarine Blue SAP
0.30% Fast Light Yellow GGXN Conc
0.40% Azo Phloxine GA Extra Conc
0.16% Supra Light Rubine BLA

Aqua: 1.0 B 5.1/5.3
0.065% Alizarine Blue SAE
0.110% Patent Blue AF Extra Conc

Lavender: 4.7 P 3.4/6.1
0.30% Alizarine Fuchsine 6 B New
0.16% Supra Light Rubine BLA
0.14% Alizarine Blue SAE

Tan: 8.5 YR 5.5/2.2
0.080% Fast Light Yellow GGXN Conc
0.035% Alizarine Blue SAE
0.025% Azo Phloxine GA Extra Conc
0.025% Supra Light Rubine BLA

Grey: 8.0 P 5.0/1.0
0.053% Alizarine Blue SAP
0.027% Fast Light Yellow GGXN Conc
0.033% Azo Phloxine GA Extra Conc
0.010% Acid Violet 4 BLD

Grey: 5.1 YR 5.1/0.2
0.060% Alizarine Blue SAP
0.050% Fast Light Yellow GGXN Conc
0.034% Azo Phloxine GA Extra Conc
0.010% Acid Violet 4 BLD

Black: 10.0 PB 0.6/0.1
8.00% Naphtylamine Black 10 BR Conc
0.40% Fast Light Orange GA Conc
0.25% Azo Fuchsine 6 B New

All dyeings were carried out with 10% of Glauber's salt and 3% of sulfuric acid for ¾ hour at the boil.

Vicara has a natural yellowish shade, which can be bleached to a white. But since radical bleaching methods are not feasible for mixtures containing wool, the trade has encountered difficulties in the production of delicate baby blue or baby pink shades. A good bleaching method has still to be found that will produce a satisfactory white on wool-Vicara mixtures. The result obtained in bleaching can be enhanced by an aftertreatment with Blancophor AW High Conc. If such yarn is dyed with Alizarine Rubinol R, Alizarine Supra Sky RA, or Sulpho Rhodamine BA, acceptable shades are obtained, especially if a product like Blancophor R is added to the dyebath. The addition of 0.5% Blancophor R to the dyebath produces in many cases astonishing results as regards brightness.

This is true not only for mixtures of Vicara and wool, but also for all-wool materials and for other mixtures containing wool. For faster shades it is necessary to use chrome dyestuffs. It is possible to produce good tone-in-tone dyeings. For instance, when Anthracene Chromate Brown EBA is dyed chromate on a mixture of Vicara and wool, deep brown shades can be obtained which are very satisfactory. However, the dyer might be greatly disappointed if he uses his regular chrome combinations as many of the popular chrome dyestuffs dye wool-Vicara selectively, leaving Vicara very much lighter. Therefore it will be necessary to work out such formulations in the laboratory before they are turned over to the dye house.

It has to be considered also that the natural yellow of Vicara is not fast to light. A beige or grey shade dyed on Vicara with fast-to-light dyes will always fade to the red side. While the yellow component in such a combination appears not to be fast enough to light, it is in reality the Vicara itself that fades. You might encounter 3 or 4 different grades of Vicara, which might dye differently and also bleach to a different white. This can be aggravated by bad blends, which have a tendency to produce a skittery effect. We have encountered one case where a formulation that resulted in a good dark-brown union shade on one blend, produced an olive on the Vicara in another blend.

NYLON

A more popular mixture is a combination of wool and nylon. Since only 10% of nylon can increase the tensile strength of a wool garment by 100%, an admixture of nylon is quite welcome to many wool manufacturers. The better the wool, the less nylon seems to be necessary to obtain a remarkable increase in strength. This means that shoddy demands a higher amount of nylon to reach the same degree of tensile strength than does virgin wool. The degree of increase of tensile strength is also dependent upon the type of material. A 10% admixture of nylon increases the tensile strength of a thin tropical worsted relatively more than an overcoating. The dyeing of mixtures of wool and nylon has often been discussed, but this problem, while not so difficult anymore as in the beginning, is still there. Long studies in laboratories and mills have established that it is impossible to recommend any single group of dyes as the best for all depths of dyeing. It is usually true that in weaker shades the nylon absorbs most of the dye before the temperature is high enough for the wool to be dyed. In heavy shades the opposite occurs. As soon as the saturation point of nylon is reached, the remaining dyestuff exhausts on the wool, thus producing an unsatisfactory tone-in-tone dyeing. This can in many cases be prevented by the proper choice of dyestuffs. Generally speaking, it can be said that dyes of lower sulfonation produce heavier shades on nylon than those of higher sulfonation. Even with consideration of this factor, it will be possible in many instances to produce shades of exceptional depth only if special dyeing methods are used. So it is possible to obtain a heavy maroon or bottle green by dyeing the nylon at 160°F with selected Celliton colors in the presence of small amounts of ammonia to prevent the acetate colors from dyeing wool, otherwise the dyeing would not be fast to crocking. After that, the wool is dyed with Palatine Fast Colors or acid dyestuffs, which in turn deepen the shade of the nylon. The results are satisfactory for women's wear, as the fastness properties are not poorer than those of regular acid-dyed woolens. While both types of colors dye nylon, the dyeing of acetate dyes is equivalent to a diffusion into a solid solution, in this case the nylon, the mechanism probably being a hydrogene bonding. Acid dyes principally attach themselves to the aminogroups of nylon. This has been shown by the relatively low exhaustion of disulfonated dyes in contradistinction to monosulfonated dyes, and the phenomenon of selective absorption is understandable if we consider that nylon has much fewer basic groups with which sulfogroups can react. Wool can bind up to 30 times more dye than nylon. Therefore a selective dyeing cannot be readily observed on wool under normal dyeing conditions. This chemical attachment does by no means exclude physical diffusion into the fiber. The number of dyes that are not physically adsorbed by nylon, however, is relatively large. They have been established by us and were published in our circular on Nylon Resist GDC. This product has an extremely high affinity for nylon, blocking active aminogroups entirely so that acid, chrome and Palatine dyes can no longer enter a chemical combination with nylon. The dyestuffs that leave resisted nylon white are those that do not dissolve into nylon to form a solid solution. Therefore nylon treated with Nylon Re-

sist GDC is not resisted for Celliton colors. Nylon Resist GDC is fast to acid cross dyeing even in the presence of 8% of sulfuric acid and can therefore be cross-dyed with Palatine Fast Dyestuffs. We do not know of any other way to obtain this effect.

If nylon is not resisted, Palatine Fast dyestuffs dye nylon readily. As a matter of fact, they are well suited for tone-in-tone dyeings on nylon-wool mixtures with the exception of Palatine Fast Yellow ELNA and Claret BNA. As with the regular acid dyes, Palatines dye nylon preferably in cases of weaker shades. If it is necessary to lessen their affinity for nylon, this can easily be done with an addition of Palatine Fast Salt N Conc Pdr, which is equally effective for other dyestuffs that exhaust with acid.

Palatine Fast Salt N Conc Pdr is an alkylarylsulfonate, which has higher affinity for nylon than many an acid dye. The affinity of Palatine Fast Salt N Conc Pdr for nylon is so great that with its help the dye can be transferred from the nylon to the wool even after the nylon has been dyed darker than the wool. Thus the dyer has a means to correct many a spoiled dyeing. However, it has to be considered that dyeings carried out with products of entirely different affinity are not easily corrected. As Palatine Fast Salt N Conc Pdr naturally first removes dyes of lower affinity, often hardly any improvement follows.

The wet fastness properties of the Palatine Fast dyestuffs are in general better on nylon than on wool. The fastness to light is at least equally as good. However, if you test their light fastness in a Fade-Ometer, the dyestuff on nylon fades usually much more quickly in the Fade-Ometer than the dyeing on the wool. Since sun exposures show that their fastness on nylon is as good as on wool, results obtained from Fade-Ometer exposures cannot be taken as a reliable criterion of light fastness. These results are just as unreliable as exposures of vat dyestuffs on wool, a fact that has been demonstrated by us on other occasions.

Anybody who studies the dyeing properties of nylon will find that different grades of nylon are on the market which show considerable differences in their affinity for dyes. A formula used successfully on one grade might be a complete failure on another. It is therefore advisable to test new mixtures in the laboratory before they are processed on a large scale.

ORLON

While the dyeing of wool-nylon mixtures is still presenting problems to the dyer, new difficulties have arisen with the advent of Orlon. The physical properties of Orlon A3* staple fiber have induced many woolen manufacturers to try this new fiber in mixtures with wool, especially when they are interested in bulkiness. With the extreme low affinity of Orlon for any class of dyestuffs it will probably not be possible to obtain any tone-in-tone dyeings. As a matter of fact, Orlon in most cases stays white while the wool absorbs all the dyestuff. It is difficult enough to obtain medium shades under pressure at 250°F. It will therefore be necessary to dye Orlon separately. Since very few mills have any pressure-dyeing equipment, it is suggested that Orlon be dyed for 1½ hours at the boil with products like:

(1) Supranol Yellow GGA Conc
(2) Supramine Yellow RA
(3) Wool Fast Orange GA
(4) Brilliant Crocein 3BA
(5) Supranol Orange RA Conc
(6) Supranol Red PBX
(7) Supranol Brilliant Red BA
(8) Alizarine Irisol RD
(9) Alizarine Supra Blue A
(10) Alizarine Cyanine Green GHN Conc CF
(11) Sulphon Navy Blue 4BA
(12) A mixture of 4% Sulphon Navy Blue 4BA High Conc, 1.5% Supranol Orange RA Conc, and 1% Wool Fast Orange GA-CF produces a good black.

In order to obtain a deep shade it is necessary to dye the above dyestuffs with 4% of sulfuric acid. With this class of dyes this might seem a rather unorthodox procedure, but even the substitution of formic acid for sulfuric acid results in shades of about ½ the depth. The fastness properties are sufficient for men's wear.

DACRON

Dacron is the latest development. This fiber is a polyester of terephthalic acid and ethylene glycol and is known in England under the name of Terylene. When Dacron is mixed with wool, for instance in a 50:50 ratio, a fabric of remarkable properties is obtained. Trousers would have an everlasting crease. If the wool were made shrink resistant, such trousers could even be washed without loss of the crease.

The dyeing of Dacron has added another problem to laboratories and dyehouses.

Under normal conditions only acetate colors have any affinity for Dacron. However, as the affinity is not sufficient, an addition of 10% of benzoic acid has been recommended as a carrier. Although this substance helps to exhaust dispersed acetate colors to a certain extent, the depth of dyeing obtained in this way is not very satisfactory.

Even though the dyeing of wool—Orlon mixtures has not been successful up to the present time, in the case of wool—Dacron blends, the situation is not so hopeless. Some Celliton colors give light to medium shades on Dacron at the boil and can therefore be used for combination shades. However, the problem here is to find Cellitons that stain wool only slightly during the dyeing process. Otherwise the fastness to crocking and also the wet fastness would be impaired because Cellitons are not fast on wool. There are only very few colors that fulfill the requirement. The results are especially bad when Cellitons are dyed with acid or Palatine Fast dyestuffs simultaneously in the presence of acid. Faster dyeings are obtained when the acetate colors are dyed first at a lower temperature. But Cellitons dye Dacron only unsatisfactory at a temperature of about 175° F. Therefore it is preferable to dye Dacron separately. In order to obtain all shades, especially navy blues and a black, a much more powerful carrier is necessary than has been used so far. We have had excellent results in our experimental work with monochlorobenzene. Laboratory and mill runs show that we can increase the strength and brightness of a dyeing several times over a dyeing carried out in the presence of benzoic acid, using, of course, the same amount of dyestuff. Thus we not only obtain stronger and brighter shades, but we are also able to produce for the first time perfect penetration of the single fiber, which has not been attained up to this time. When Dacron was dyed in that way in a blend with wool, and when the wool was subsequently dyed with Palatine Fast dyestuff, we obtained shades of the same fastness to perspiration as would be obtained on an all-wool yarn, provided that a machine is used where the material is under the liquor during the dyeing process. We have also obtained good results on Dacron tops and staple fiber in various mill equipment.

We have found that some acetate colors are not so fast to light on Dacron as on acetate rayon when exposed in the Fade-Ometer. But the same acetate dyeings on Dacron exposed in regular sunlight for a corresponding time are, relatively, considerably faster. This is an indication that we have here another case where Fade-Ometer exposures do not correspond to sunlight exposures. Monochlorobenzene makes it also possible to dye Dacron with vat colors at temperatures below the boil. We hope to report on this development in the near future.

* This fiber has recently been withdrawn from the market.

Cotton Group———

STUDIES WITH TITANIUM AS AN AGENT FOR IMPARTING DURABLE FIRE-RETARDANCY TO FABRICS*

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The various types of fire-retardant treatments are cited. These can be classified as the nondurable type, which employ well-known water-soluble salts, the semidurable type, which employ nitrogenated phosphates, and the durable type, which can be further subdivided as organic and inorganic. The organic type employs a resin as a binder for the other components. Brominated polyphosphate ester, which has received limited evaluation, is also in this class. Representative of the inorganic type are the stannates and compounds in the titanium-antimony systems.

Previous studies of the use of solutions of titanium-antimony chloride-acetate are discussed as an introduction to results reported covering the use of silicates in the neutralization bath to minimize afterglow. Commercial brands of sodium silicate were investigated, and an optimum amount was determined. It has been found that fabrics of various weights can be successfully fire-retarded by means of titanium-antimony-silicon treatment.

Fire-retardant properties and analyses of four-ounce sheetings are presented showing retention of agents through twenty-four launderings.

Studies in connection with fire-retardant mechanism are reported and explanations proposed. The studies are supplemented with micrographs.

INTRODUCTION

It has long been recognized that destruction and loss of life through fire make it highly desirable that treatment of flammable materials to make them fire-resistant should be practiced. There is therefore an ever increasing interest in fire-resistant treatments. Since there have been excellent published articles and papers, even to the extent of giving evaluations of the various fire-retardant agents, only a brief review of them will be considered in this paper. Part of this paper will be devoted to the reporting of investigations carried out in perfecting a durable-type treatment employing compounds of titanium, antimony and silicon. Studies in connection with the mechanism responsible for the excellent performance of this treatment will also be considered.

CLASSIFICATION OF FIRE RETARDANTS

The various types of treatment have been classified as temporary, semidurable and durable *(1)*. While the temporary and the semidurable types of treatment can satisfactorily meet requirements for some purposes, it is generally accepted that the durable type is the most desirable for all materials and is an absolute necessity in cases where the materials require laundering, dry cleaning or must withstand weathering. Since there are distinctive characteristics among the durable types, it is advisable in this paper to subdivide them still further into two classes, organic and inorganic.

TEMPORARY TYPE—The temporary type consists of soluble salts, which may be applied to the material from aqueous solution. The salt will be resolubilized if laundered or if it comes in contact with water. There are many salts that may be employed, and therefore literally hundreds of combinations are possible. These salts include borates, phosphates, sulfamates, etc.

SEMIDURABLE TYPE—The semidurable agents are represented by nitrogen-phosphate compounds and may be applied from aqueous solution, after which the treated fabric is given a heat cure at elevated temperatures. The treatment has the disadvantage of tendering the fabric. Also this treatment is not durable to alkaline laundering or salt solutions.

DURABLE TYPE—The organic type may be represented by resins, such as chlorinated wax. The shortcomings of this type are the high add-on required and stiffening of the fabric. A recent type, which is claimed to be durable, employs a brominated polyphosphate ester *(1, 5)*. Experience with this agent is limited.

Inorganic types include stannic and titanium agents. Titanium salts have been referred to in literature as fire-retardant agents, and a literature survey has been

TABLE I

VARIATION OF SODIUM SILICATE CONTENT IN THE ALKALINE BATH
On 8.2-oz Desized Cotton Twill

			45° Microburner Test[a]				
Sodium[a, b, c] Silicate g/l	SiO_2[d] %	Add-on[e] %	After-flame sec	Afterglow[f] sec	Char Area in²	Hand Estimated	Appearance Estimated
0	—	20.2	0	720	8.0	good	good
0.5	—	20.7	0	710	8.0	good	good
1.0	—	21.4	0	667	6.0	good	good
2.0	—	20.1	0	660	6.0	good	good
3.0	—	21.0	0	420	3.0	good	good
5.0	0.39	21.4	0	420	3.0	good	good
10.0	0.53	21.6	0	326	3.0	good	good
15.0	0.80	21.4	0	306	3.0	good	good
20.0	1.00	21.9	0	27	3.0	good	good
30.0	1.14	20.6	0	25	3.0	good	slightly dusty
50.0	1.30	20.7	0	10	3.0	good	slightly dusty
100.0	1.40	21.3	0	2	3.0	good	dusty
150.0	—	21.1	0	2	3.0	good	very dusty

(a) Anhydrous Na_2CO_3, concentration = 150 g/l
(b) $Na_2SiO_3 \cdot 5H_2O$
(c) Specimens leached in running tap water for 10 minutes
(d) Determined gravimetrically
(e) Wet pick-up about 100%
(f) In char area

* Presented at the Twenty-ninth Annual Convention in Portsmouth, N H, on September 29, 1950, by A E Jacobsen.

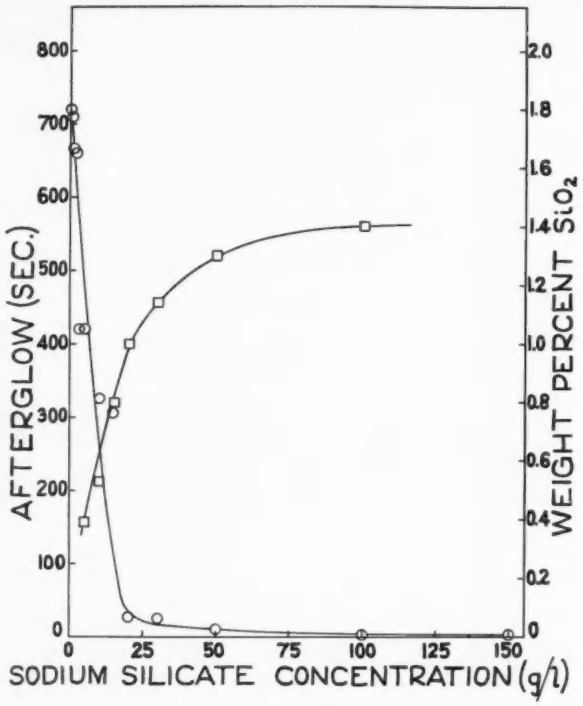

Figure 1
Effect of Sodium Silicate Concentration on Time of Afterglow and % Silica Retained

recently given *(6)*, but very little use has been made of them until recently *(3, 6)*. Even in these reports the actual ingredients are titanium and antimony compounds, and not titanium compounds alone. The principal advantage of the titanium-antimony agent is the relatively low add-on for imparting a durable treatment without seriously affecting the original properties of the materials.

PREVIOUS STUDIES WITH TITANIUM

In a previous paper by the authors *(6)*, which reported research and development of a titanium agent, it was shown that the impregnation of the fabric with a titanium-chloride-acetate solution, partial drying (approximately 35% at an initial pickup of 85%) and then alkaline treatment with final washing to remove the salts resulted in good flame-retardant properties, but poor glow-retardant properties. Further, upon water leaching, the treated material lost flame resistance. It was shown, however, that the inclusion of antimony trichloride in the impregnating solution reduced afterglow and increased resistance to water leaching as well as laundering. It should be mentioned, however, that afterglow was sufficient to consume a con-

Figure 2
Electron Micrograph of Untreated Fiber
Magnification 6,000 X

Figure 3
Electron Micrograph of Treated Fiber
Magnification 6,000 X

siderable amount of the fabric. Studies for improving afterglow were therefore undertaken and are described below.

EXPERIMENTAL

STUDIES TO IMPROVE AFTERGLOW—It is generally agreed in the trade that complete elimination of afterglow without impairment of other properties is highly desirable, particularly for some types of materials. For others a short afterglow period can be tolerated provided it is confined within the char area. Complete elimination of afterglow is undoubtedly an ideal condition to be strived for, and to attempt this, an investigation was undertaken of the use of additives in the impregnating solution and also in the alkaline bath. Additions to the impregnating solution yielded poor results, but it was found that the addition of silicates to the alkaline bath had a marked influence in reducing afterglow. This may be seen from the data presented in Table I and Figure 1. These data clearly show that the addition of increasing amounts of sodium silicate to the alkaline bath reduced the time of afterglow of a treated 8.5-oz tan-colored herringbone twill to relatively low values. The addition of excessive amounts reduced the time of afterglow to almost zero, but at this high concentration of silicate a whitening and dustiness of the fabric occur. From these results it would appear that a sodium silicate concentration of 20 g/1 offers a satisfactory compromise since it reduces afterglow to a reasonable value without significantly affecting the appearance of the fabric. To determine the extent of silicate retention by the twill, analyses for SiO_2 content were obtained. These results are also plotted in Figure 1 and show that the amount of SiO_2 retained approaches an upper limit with increased sodium silicate concentration. It should be noted particularly that, at a sodium silicate concentration of 20 g/1, the SiO_2 pickup amounts to about 1%.

In order to determine if all types of silicates are effective and to establish the most suitable one, a variety of such products was studied on 3.5-oz printed percale. The results in Table II show that all types of sodium silicate are effective in reducing time of afterglow and that sodium metasilicate pentahydrate, which was used in studies reported in Table I, is as good a choice as any.

While the initial afterglow studies were

TABLE II

VARIATION OF SODIUM SILICATE TYPE IN THE ALKALINE BATH
On 3.5-oz Printed Percale

45° Microburner Test[a]

Sodium Silicate Type[a, b]	*Add-on*[c] *%*	*Afterflame sec*	*Afterglow*[d] *sec*	*Char Area in*^{2}
—	22.0	0	500	4.5
CP $Na_2SiO_3 \cdot 5H_2O$	21.1	0	3	3.0
"N," $Na_2O \cdot 3.22\ SiO_2$	21.0	1	12	2.0
"E," $Na_2O \cdot 3.22\ SiO_2$	22.8	0	45	2.0
"Metso" $Na_2SiO_3 \cdot 5H_2O$	22 4	0	20	2.0
"Seal," $Na_2O \cdot 2.9\ SiO_2$	18.2	1	39	2.0
"Star," $Na_2O \cdot 2.5\ SiO_2$	22.8	0	82	2.0

(a) Anhydrous Na_2CO_3 concentration = 150 g/1 sodium silicate concentration = 20 g/1
(b) Specimens leached in 0.5% Igepon T at 70°C for 5 minutes, rinsed and dried
(c) Wet pick-up about 100%
(d) In char area

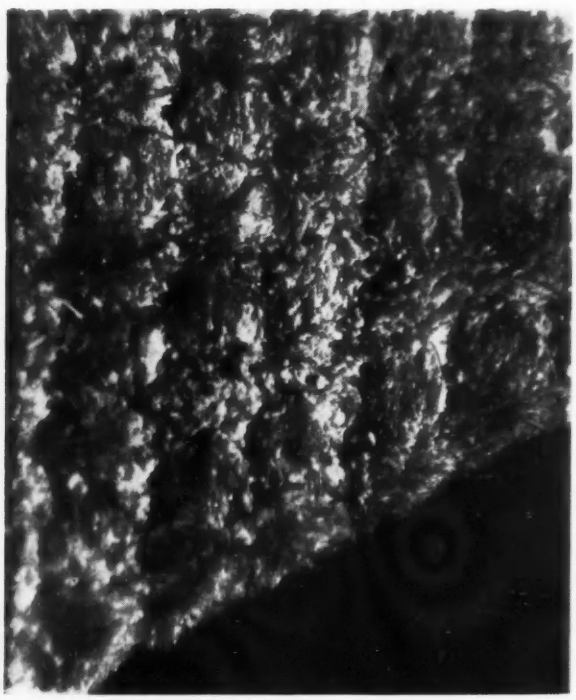

Figure 4
Edge of Char Area of Silica Free Specimen
8.5 oz Herringbone Twill
Magnification 32 X

Figure 5
Edge of Char Area of Silica Containing Specimen
8.5 oz Herringbone Twill
Magnification 32 X

TABLE III

PERFORMANCE OF VARIOUS FABRICS

Fabric, Cotton	Add-on %	45°-Microburner Test[1] — Afterflame sec	45°-Microburner Test[1] — Afterglow[a] sec	45°-Microburner Test[1] — Char Area in²	Vertical Bunsen Burner Test[1] — Afterflame sec	Vertical Bunsen Burner Test[1] — Afterglow sec	Vertical Bunsen Burner Test[1] — Char Length in	Tensile Strength Estimated	Hand Estimated	Appearance Estimated
Marquisette	19.3	0	5	6.0	0	6	4.5	good	good	good
Organdy	15.5	0	3	6.0	0	5	4.5	good	good	good
White Broadcloth	17.7	0	2	4.5	0	8	3.0	good	good	good
Printed Percale	19.5	0	4	3.0	0	24	3.2	good	good	good
Printed Cretonne	20.2	0	15	3.0	0	18	2.0	good	good	good
5.5-oz Oxford Cloth	22.6	0	16	4.5	0	16	3.7	good	good	good
8.0-oz Twist Twill Suiting	19.9	0	10	4.5	0	48	3.0	good	good	good
8.0-oz Duck	19.0	0	20	3.0	0	100	2.0	good	good	good

(a) In char area

made with 8.5-oz herringbone twill and those using the various silicates with 3.5-oz printed percale, other fabrics have also been treated. The performance of some of them is illustrated in Table III. In all cases sodium silicate was added to the alkaline bath. These results confirm that light-weight materials can be made practically free of afterglow while heavy-weight materials show some afterglow.

In order to establish that this type of treatment of cellulose is relatively permanent, even to the extent of permitting repeated launderings, performance studies were made on a treated sample of 4-oz sheeting. These findings, which are given in Table IV, show that neither afterflame nor afterglow were affected by 24 laundering cycles, and that a significant increase in char length was obtained only after 12 cycles. Analyses show that the TiO_2 content remained constant within experimental error during laundering while the Sb_2O_3 content decreased slowly.

FLAME-RETARDANT MECHANISMS

AFTERFLAME—In a previous report by the authors *(6)* evidence indicated that TiO_2 served as a carrier gel for adsorbed alkali, which was presumably liberated at flame temperatures and catalyzed the decomposition of cellulose to yield a minimum of flammable tarry products. The role of Sb_2O_3 in increasing the laundering resistance of treated fabrics was postulated to be one of increasing the adsorption capacity of the TiO_2 gel. Additional studies to clarify this mechanism were directed toward confirming that the presence of Na_2O was essential for securing flame retardancy and toward determining the structure of the titanium and antimony compounds present. That the treatment produced less flammable tarry products and more char with fabrics than did ineffective treatments was not investigated since earlier work by Coppick (see Little's *(4)*) and more recent work by Coppick, Church and Little *(2)* have indicated this behavior to be quite general.

Earlier experiments on the correlation between Na_2O content and afterflame were carried out with a titanium-chloride-acetate solution as starting material. The first series of fabrics treated by precipitating the titanium values with sodium hydroxide were water leached, and a decrease in Na_2O content was shown to be accompanied by a simultaneous increase in time of afterflame. In the second series, increase in time of afterflame and decrease in Na_2O content were caused by increasing the amount of P_2O_5 present in the alkaline bath. Since antimony salts were not present in either of these experiments, it was desirable to secure experimental verification that Na_2O was also an essential component of this binary treatment. It was found impossible, however, to bring about an increase in time of afterflame by repeated laundering with ordinary soaps and detergents. Hence, a correlation between time of afterflame and Na_2O content could not conveniently be determined for this type of treatment. Data were recorded, however, which show that the Na_2O content could not be lowered beyond a minimum value by repeated laundering with Igepon T and a regular water rinse. This is also illustrated by Table IV.

Electron micrographs of treated fabrics were obtained by means of a collodion replica and chromium shadowing technique similar to those described by Wyckoff *(7)*. Figure 2 shows an untreated and Figure 3 a treated Swiss muslin. Comparison shows that at least a part of the fire-retardant treatment is on the surface of the fibers but that the particle size is below the visible range.

AFTERGLOW—As in the case of afterflame, the mechanism by which afterglow may be eliminated or reduced by sodium silicate addition is difficult to establish by study of reactions during flame impingement alone. Observations have indicated, however, that the sodium silicate serves as a flux and fuses with or reacts with the other components present at flame temperatures. This may be seen from photomicrographs, Figures 4 and 5. These photomicrographs demonstrate the condition of the uncharred area and the adjacent charred area of silicon-free and silicon-containing specimens. The silicon-free specimen shows aggregates of finely divided powder intermingled with the fibers, whereas the photomicrograph of

TABLE IV

INFLUENCE OF LAUNDERING ON FIRE RETARDANCY AND PERMANENCE OF TREATMENT[a]

Laundering Cycles[b]	Vertical Bunsen-Burner Test[1] — Afterflame seconds	Afterglow seconds	Char Length inches	TiO_2[c] %	Sb_2O_3[d] %	Na_2O[e] %	SiO_2[f] %
0	0	8	3.5	6.0	8.1	0.43	0.93
3	0	8	3.4	5.9	8.0	0.04	—
6	0	7	2.8	5.6	7.3	0.03	—
9	0	7	3.7	6.5	7.1	0.03	—
12	0	8	3.6	6.4	6.6	0.03	—
15	0	9	4.3	6.1	6.1	0.04	—
18	0	8	4.2	6.0	6.0	0.04	0.78
21	0	10	4.5	6.3	5.8	0.06	—
24	0	10	4.7	5.9	5.2	0.06	—

(a) Samples were prepared by immersing 4-oz sheeting for 5 minutes in a solution of titanium acetate-chloride and antimony chloride having a concentration of TiO_2 = 100 g/l, of Sb_2O_3 = 128 g/l, of HCl = 187 g/l, and of acetic acid = 150 g/l. After being squeezed with a hand wringer they were immersed for an additional 5 minutes and squeezed to about 85% wet pickup. The impregnated fabrics were then partially dried at 25°C for 120 minutes to about 35% pickup. They were then immersed with agitation for 5 minutes in an alkaline bath containing 150 g/l of sodium carbonate and 20 g/l of sodium metasilicate pentahydrate. Finally, the fabrics were washed in running tap water for 10 minutes and dried at 100°C.
(b) According to U S Army Specification 100-79, par 4.3.2.
(c) Determined by the reduction of H_2SO_4 solution with zinc amalgam and titration with standard ferric ammonium sulfate solution.
(d) Determined by reduction of antimony to trivalent state with sodium sulfite and oxidation to pentavalant state with standard $KMnO_4$.
(e) Determined with a flame photometer.
(f) Determined gravimetrically.

Silicate-treated Silicate-free

Figure 6
Glow Resistance of Silicate-treated Percale

the silicon-containing specimen shows continuity of the fibers and freedom from powder. The evidence, therefore, suggests that silica that has been deposited upon the surface of fibers produces a coating, which excludes oxygen for combustion of the carbon residue resulting from dehydration during initial contact with the flame.

A practical demonstration of the effectiveness of the sodium silicate treatment on dyed percale is given by Figure 6. The specimen on the right, which has not been treated, has been consumed through creepage of afterglow, whereas the specimen on the left has only been charred by flame impingement. It was necessary to quench the untreated specimen in order to prevent complete consumption of the fabric.

CONCLUSION

The above studies have been primarily carried out in order to refine results which have been obtained with titantium-antimony treatments. It has been possible to reduce the time of afterglow to a very low value by the addition of sodium silicate to the alkaline bath. Furthermore, it has been demonstrated that the process is applicable to a wide variety of fabrics and that the treatment is sufficiently durable to withstand twenty-four launderings without appreciably affecting the fire-retardant properties.

ACKNOWLEDGMENT

Appreciation is expressed to the following members of this laboratory: L E MacCardle, W R Lasko and C E Reynolds for chemical analyses and photographs.

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DISCUSSION

Question: Has any work been done on rayon?

Answer: Yes, on both viscose and Bemberg rayon; the treatment is not satisfactory, however, on acetate.

Q: What about the cost of the treatment?

A: We do not have processing costs for the treatment, but we know that the chemical cost is about 20 cents per pound of fabric.

Q: Is your process suitable for weighting and flameproofing silk, or is the bath too alkaline?

A: The treating bath is, I think, too alkaline for silk. The temperature for both treatment and neutralization is moderate, however, being carried out cold.

Q: Do you have to use carbonate for neutralization?

A: There is no reason why sodium bicarbonate might not be employed. The use of bicarbonate, however, would decrease the effectiveness, and the retention time in the bath would have to be increased.

Q: What is the mechanism of retention of sodium by titanium?

A: In the early part of the paper we showed that approximately 0.5% of sodium oxide was retained on the fabric upon treatment with titanium chloride-acetate solution. I would say that the power of titanium to hold sodium depends upon the fact that it forms a highly adsorbent hydrous gel, which can hold metal oxides.

— ◆ ◆ —

Future Pacific Southwest Meeting Dates Set

MEETING dates for the 1951-52 season have been arranged by the Pacific Southwest Section as follows:

August 3, 1951—Dinner at 7:00 pm, Nikabob Restaurant, 875 South Western Avenue, Los Angeles, Cal.

Subject: "Temperature and Related Controls for Textile Processing."

October 6, 1951—Annual Outing, Ojai Valley Inn, Ojai, California. Luncheon at 12:00 noon, dinner at 7:00 pm.

January 11, 1952—(place and subject to be announced).

March 28, 1952—(place and subject to be announced).

— ◆ ◆ —

New York Section Meeting Date Change

THE April, 1952 meeting of the New York Section, originally set for April 18 at the Swiss Chalet, will be held one week earlier in order not to conflict with Good Friday.

Members of the Student Chapter, State University of New York, Institute of Applied Arts & Sciences, Utica, N Y.

Left to right:
1st row: Lester R Henry, advisor; Louis Bien, treasurer; Anthony Cassetta, vice-president; Ernest Larrat, Jr, president; George Aumick, secretary; Louis F Haage, advisor
2nd row: Henry Wilensky, Flor Boldevskul, Alexander Wilson, Stewart Kaplan, Robert Lynch, Donald Mulvey, Irwin Lederman
3rd row: C Drake Bostedo, Joseph Mastracco, Norman Thompson, Lino DeGasperis, John Cargash and Henry Cieply
4th row: David Griffith, Eugene Suozzo, Anthony Caezza, Jack Lashinsky and John Patterson

UTI Meeting Reports

April 19, 1951

AT a meeting of the Utica Technical Institute Student Chapter on April 19, 1951 officers were elected as follows:

Chairman—Eugene Suozzo.
Vice-chairman—C Drake Bostedo.
Secretary—Norman R Thompson.
Treasurer—Lino DeGasperis.

May 10, 1951

AT the May 10, 1951 meeting of the Utica Technical Institute Student Chapter Ernest Larrat, Jr, presided and introduced the new Chairman, Eugene Suozzo. The guest speaker was John A Davis, Oneida Bleachery, who spoke on the subject of dyeing. Plans were made for the annual outing.

Respectfully submitted,
GEORGE AUMICK,
Secretary

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

51-8

Education: High School, and Correspondence School in Chemistry.
Experience: Colorist and printer, 18 years.
Age: 37; married; references.
6-25, 7-9

51-9

Education: High School.
Experience: Boss Finisher, Printing plant.
Age: 50; married; references.
7-9, 7-23

51-10

Education: High School and Philadelphia Textile Institute, night.
Experience: Dyer, 32 years.
Age: 50; married; references.
6-25, 7-9

51-11

Education: B S, Chemical Engineering.
Experience: Textile Chemist.
Age: 24; veteran; single; references.
6-25, 7-9

Rhode Island Section Meeting Report

May 25, 1951
Johnson's Grill, Providence, R I

A MEETING of the Rhode Island Section was held on Friday evening, May 25, 1951, at Johnson's Grill, Providence, R I, with about 175 attending. The speakers were Dr R J Thomas of the Technical Laboratory, Dyestuffs Division, E I duPont de Nemours & Co, Inc, on "High Temperature Dyeing of New Synthetic Fibers"; and Dr W E Coughlin, Director of the Textile Laboratory of the Good Housekeeping Institute, on "Textile Testing from the Consumer Standpoint."

Respectfully submitted,
R G THOMAS,
Secretary.

—♦ ♦—

PTI Student Chapter Elects New Officers

THE Philadelphia Textile Institute Student Chapter on June 10 elected the following slate of officers for the 1951-52 school year:

Chairman—John McLuckie, Jr.
Vice-chairman—Joseph W Lynch.
Secretary—Alfred W Cowan.

—♦ ♦—

Membership Applications

SENIOR

Irving L Bailey—Chemist, Stillwater Worsted Mills, Inc, Harrisville, R I. Sponsors: A S Mackenzie, D R Meikle.

Eugene P Bebeau—Supt Dye & Finish, Dan River Cotton Mills, Danville, Va. Sponsors: G O Linberg, W B Carroll, Jr.

James A Bertrand—Analyst, Collins & Aikman Corp, Bristol, R I. Sponsors: G S Hiers, E J Grajeck.

James A Brazel—Plant Mgr, Textron, Inc, East Greenwich, R I. Sponsors: A J Lombard, E W Birdsall.

John C Brooks—Gen Overseer Dyeing, Dan River Mills, Danville, Va. Sponsors: G O Linberg, W B Carroll, Jr.

Clayton H Carlson—Supt, Lincoln Bleachery Dye Works, Lonsdale Co, Lonsdale, R I. Sponsors: J J Roarke, G M Gantz.

Maynard A Cherof—Converter, Burlington Mills Corp of New York, New York, N Y. Sponsors: M Schuster, C A Heydon.

William F Chivall — Salesman, Colloids, Inc, Newark, N J. Sponsors: S Parry, H C Selya.

Joseph M Chuck, Jr. — Compounder, Charles J Haas, Inc, Philadelphia, Pa. Sponsors: W H Moon, P W Volk.

Joseph H Collie—Technical Sales, Polychemicals Dept, E I du Pont de Nemours & Co, Inc, Wilmington, Del. Sponsors: L Kennette, J L Moore.

Preston W Cook—Dye Supt, Cook Yarn Dye Mills, Inc, Phillipsdale, R I. Sponsors: F H Casey, R R Farwell.

James Dammicci—Text Colorist, Calco Chemical Div, American Cyanamid Co, Bound Brook, N J. Sponsors: H E Millson, S Mooradian.

Harold Elkin—Text Colorist, American Aniline Products, Inc, New York, N Y. Sponsors: W D Baird, F F Kraft.

James D Emmart—Foreman Dyer, Virginia Dyeing Corp, Emporia, Va. Sponsors: G O Linberg, M J Curtil.

Henry S Falls—Lab Supervisor, J P Stevens & Co, Greensboro, N C. Sponsors: E A Briggs, A C Hayes.

Franklin Farrington — Director, James Hardcastle & Co, Ltd, New Bolton, Lanc, England. Sponsors: H H Bailey, R J Ross.

Alexander C Ferguson—Asst to Supt, Toledo Dye Works, Div, Textileather Corp, Toledo, Ohio. Sponsors: W C Snead, L E Schall.

Archie A Gallinger — Foreman Dyer, American Velvet Co, Stonington, Conn. Sponsors: J E Lawton, F H Casey.

Albert P Garant—Dyer, Warwick Dyeing & Finishing Co, West Warwick, R I. Sponsors: C A Gaudette, J C Denham.

Edward Haigh—Asst Colorist, Apponaug Div, The Aspinook Corp, Apponaug, R I. Sponsors: G H Wood, C W Dennis.

Willie M Harger—Boss Dyer, The Alden Mills, Meridian, Miss. Sponsors: E L McLellan, M J Hoffman.

John M Harvey—Supt of Dye, Central Yarn & Dyeing Co, Gastonia, N C. Sponsors: C D Potter, J W Robertson.

Mahlon Heist — Salesman, Commercial Products Co, Philadelphia, Pa. Sponsors: G Tjaden, A E Raimo.

Gilbert H Jeffrey—Field Engr, Titanium Alloy Mfg Div, National Lead Co, Niagara Falls, N Y. Sponsors: C R Bellwood, A A Cook.

Malcolm L Jewell—Research Chemist, Bates Mfg Co, Lab Div, Lewiston, Maine. Sponsors: H A Wormwood, W P Heintz.

Anders H Jonsson—Dyer, Burlington Mills Corp, Greensboro, N C. Sponsors: B B Swanson, T F Malloy.

Leo F Kollek—Director of Colouristic Dept, Badische Anilin- & Soda-Fabrik, Ludwigshafen a Rh, Germany. Sponsors: H E Hager, C Z Draves.

Philip J LaMonica—Coordinator of Dye & Finish, Burlington Mills Corp of New York, N Y. Sponsors: M Schuster, C A Heydon

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Herve J Paquin—Lab Technician, Manchester Finishing Plant of Textron, Inc, Manchester, N H.

Howard E Parks—Supt of Dye Dept, Flock Embossing Corp, Phillipsburg, N J.

Robert A Schlaak—Consulting Engr, U S Hoffman Machinery Corp, New York, N Y.

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Application for Transfer to Senior Membership: John C H Dempsey.

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COMING EVENTS

AMERICAN ASSOCIATION OF TEXTILE TECHNOLOGISTS

Meetings: September 12, October 3, November 7, December 5 (Builders Club, New York).

AMERICAN CHEMICAL SOCIETY

Meetings: September 3-7 (New York, N Y).

AMERICAN OIL CHEMISTS' SOCIETY

Fall Meeting: October 8-10 (Edgewater Beach Hotel, Chicago, Ill).

AMERICAN SOCIETY FOR TESTING MATERIALS

Spring Meeting and Committee Week, March 3-7, 1952, Cleveland, Ohio.

Annual Meeting, June 23-27, 1952, New York, N. Y. (The biennial Apparatus and Photographic Exhibits will be held in conjunction with this meeting).

FIBER SOCIETY

Meetings: September 13-14 (Swampscott, Mass.); April 16-17, 1952 (Clemson House, Clemson, S. C.)

NATIONAL ASSOCIATION OF COTTON MANUFACTURERS

97th Annual Meeting: September 13-14 (New Ocean House, Swampscott, Mass).

NATIONAL ASSOCIATION OF TEXTILE MACHINERY MANUFACTURERS

Exhibit of American Textile Machinery, April 26-May 1, 1954, Atlantic City Exhibition Hall, Atlantic City, N. J.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES

Luncheon Meetings—Hotel Commodore (September 12, October 10, November 14).

Annual Meeting and Dinner—Hotel Commodore (December 11).

TEXTILE RESEARCH INSTITUTE

Annual Meeting, Nov. 8-9.

ABSTRACTS

Dyeing "Ardil"

J Henderson, Dyer 105, 557-62, May 4, 1951.

"Ardil" is the name given by the Nobel Division of I C I Ltd to the latest addition to the range of synthetic protein fibers. Fibers of this type are by no means new, but Ardil is the first to be developed commercially from peanut protein.

The processes involved in the production of any of the well-known synthetic protein fibers are similar. After extraction of the protein from the raw material it is spun from an aged solution in caustic soda by extruding it into a coagulating bath, stretching and then hardening with formaldehyde. Fibers from different sources show some variation in physical and chemical properties, but generally speaking all are different from wool in that:

(1) They have a lower tensile strength, especially when wet;

(2) They liberate formaldehye at high temperatures;

(3) They absorb dyestuffs much more rapidly and at lower temperatures;

(4) Dyestuffs are less fast to wet treatments.

Analysis has shown that the main difference in chemical constitution between synthetic protein fibers and wool is that wool has approximately 5-7 times higher cystine content (-S-S-).

The formaldehyde treatment, which is carried out in the presence of acid and salt, is a very important step in the manufacturing process. The formaldehyde which is liberated at high temperatures may be up to 1 per cent on the weight of the fiber, and this is capable of reducing appreciable quantities of certain level dyeing acid and chrome colors. This destructive effect on sensitive dyes increases with increasing temperature. It has been observed that where decomposition of dyestuff does take place, it occurs in the dyebath and not on the fiber, and consequently when dyeing wool-Ardil unions both fibers are dyed weak.

The final Ardil product is a cream- to brown-colored, soft, lustrous, crimped fiber that has a circular cross-section and a smooth outer surface. It is unaffected by organic solvents and is resistant to acids and alkalis at the concentrations usually employed in textile processing. It is gelatinized and finally dissolved at high temperatures by caustic soda solutions (over 0.5 per cent NaOH), but its resistance is greater than that of wool. The tenacity of Ardil is 10 kg per square mm and the elongation at break 50-100 per cent. It is therefore weaker but more elastic than wool, and when wet shows a greater loss in tensile strength than wool. Its resistance to abrasion is inferior to that of wool, but in union with that fiber the wear resistance is higher than expected. Unions of Ardil and viscose rayon staple fiber are actually more durable than all-viscose fabrics. Ardil is also more crease-resistant than cellulosic fibers. The felting properties of Ardil alone are poor, since (unlike wool) it has no scales. It does, however, actually promote the felting of wool, and wool-Ardil unions can be felted quicker and at lower temperatures than all-wool fabrics. Ardil is mothproof and has the same thermal conductivity as wool.

The chemical resistance of Ardil is such that it will withstand treatments under all the conditions normally employed in the scouring of textile materials. At the moment, however, the pH of the fiber must be taken into consideration, and if it is acid, scouring is best carried out with a nonionic type of detergent, together with alkali. The amount of soda ash used in normal wool scouring has been found to have little effect on the dyeing properties, when using level dyeing acid dyestuffs or chrome dyestuffs applied by the after-chrome process. When applying neutral dyeing acid dyes and chrome dyes by the metachrome method, however, a greater control over the pH of the Ardil fiber is necessary, especially when dyeing wool-Ardil unions. Too high an acid content will give rise to heavier shades on the Ardil, and too high an alkali content to weaker shades on the Ardil. (Alkaline Ardil results from the use of excessive quantities of alkali in scouring).

Bleaching of the material will be necessary where maximum brightness is essential. In all cases this is best carried out by treating in 3 volumes hydrogen peroxide buffered to pH 9.0-9.4 with sodium pyrophosphate or sodium silicate. The period of treatment is three hours at 50° C or overnight at 20-30° C. Reducing treatments also bleach Ardil, but the original color returns on exposure to light.

The author reviews all the main types of dyestuffs (level dyeing acid, acid milling, direct, premetallized, chrome, etc, all of British manufacture) examining their suitability for the dyeing of Ardil and Ardil-containing materials.—WHC

Sizing and Desizing of Synthetics

C F Bishop, Canadian Textile J 68, *65, 67, 69, 71*, May 11, 1951.

The sizing of synthetic fibers has improved in recent years aided by the improvements made in slashing equipment and systems. There has been an almost universal change from the silk system to the cotton system of sizing wherever the styles run by a mill permit this to be done.

The nature of the size being used depends on the type of synthetic fiber being handled. A good knowledge of the construction of a fabric being sized and its requirements is extremely necessary, as well as a thorough knowledge of the yarn and the type of size to be used.

The amount of size necessary to do a satisfactory weaving job depends on several factors. The first is one of construction or fabric style. This factor controls the amount of abrasion a yarn will receive in the loom, and also any size limitations such as those encountered in sizing plain weaves such as taffetas and French crepes. Such styles require a minimum amount of size to yield a maximum amount of flexibility to the yarn. The type of yarn, the twist in the yarn (or lack of twist), the type of loom and the weave room conditions are all qualifying factors which control the amount of size needed.

Size pickup is dependent on the type of yarn being sized, the nature of the fiber lubricant or spin finish on the particular yarn, and also the type of size being used. The speed at which the slasher is being run is another factor which controls the amount of size taken up. We have found that at very slow speeds, yarn has a tendency to pick up less size than when it is being run at normal production speeds. Also, the pressure per linear inch exerted by the roll and whatever weights are applied to it, as well as the density of the roll itself, has a great deal to do with the amount of size to be used in the formula.

Many advances have been made in recent years with the use of synthetic sizes. At the present time sizing may be carried out using whatever temperature a mill wishes. It is now possible to vary the amount of size pickup by several methods: by varying the size concentration, the amount of pressure on the squeeze roll, or the temperature of the size pan.

The type of size generally used on filament yarns is rather low in viscosity, varying anywhere from four to thirty centipoises at operating temperatures. We have found that the initial viscosity of the size changes tremendously as the yarn (acetate in particular) releases spin finish in the size box as it is passing through. Apparently these spin finishes are emulsified and build up in the size box to a point of equilibrium.

The predominant nylon sizes in use today are polymethacrylic and polyacrylic resins; also a few formulas with polyvinyl alcohol as a basic ingredient are being used. It is advisable to use a fairly high squeeze roll pressure and low can temperature when sizing nylon.

Regarding desizing, this is no particular problem today on filament yarns. A synthetic size washes off very easily. Hot water with a little water softener or TSPP and a mild detergent are all that is necessary to remove the size completely. Desizing spun yarns is not quite as easy; since most of the sizing compounds are basically modified starches or gums, it is necessary to give them an enzyme treatment followed by a good boiloff.

The speaker emphasized the importance of careful control of the slashing operation, and discussed various problems relating to defective sizing. A long question-and-answer period followed.—WHC

Book Reviews

OFFICIAL METHODS OF ANALYSIS OF THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS

Seventh Edition. Henry A Lepper, Chairman of Editorial Board
910 pages; reprints of changes in this edition —$1.00
Association of Official Agricultural Chemists, P O Box 540, Benjamin Franklin Station, Washington 4, D C (1950)

The seventh edition of Official Methods of Analysis of the AOAC is a complete and up-to-date laboratory reference manual of standard analytical procedures. The book is edited by and designed for the agricultural chemist; however, its detailed coverage of analytical methods applicable to those articles essential to, as well as the products of, agriculture, makes this volume a valuable reference book of official methods for all chemical laboratories.

The book is well organized in sections, covering a variety of subjects, such as: fertilizers, poisons, soils, plants, foods and beverages, oils, fats, waxes, drugs, vitamins and coloring matter. A general index provides an easy means of locating a specific analysis. In addition, the volume is profusely illustrated with diagrams of special apparatus and contains thirty-one reference tables.

This publication represents the collective efforts of the AOAC in the study, development, and sponsorship of all analytical methods applicable to agriculture and related fields. Provision is made whereby purchasers of the book will be furnished with reprints of changes in methods as they are adopted at subsequent meetings up to the year of the next edition.—EPJ

COLLOIDAL DISPERSIONS

1st edition; E K Fischer
387 pages; $7.50
John Wiley & Sons, Inc, 440 Fourth Avenue, New York 16, New York (1950)

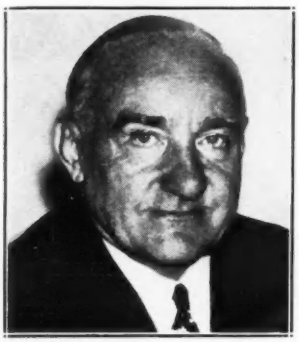
Dealing with an extremely complex subject, namely the dispersion of finely divided solids in liquid media, this book throws light on many operations and phenomena of fundamental importance in the manufacture of paint, printing inks, textiles and many other products. It deals adequately with both aqueous and nonaqueous dispersions.

Commencing with a discussion of methods for the determination of particle size; fundamental properties of the solid-liquid interface flocculation, agglomeration and their relationship to the rheological properties of dispersions are next reviewed. These chapters are perhaps the most useful and thought-provoking in the book. Dr Fischer continues with a description of the application and uses of surface-active agents before giving a detailed account of the various methods of comminution. This, if any part of the text deserves criticism, is perhaps the weakest section. The reviewer missed any discussion of the economics and relative costs of the processes described. This is surely in order in a book claiming "to cover both the theoretical and practical aspects of colloidal dispersions."

After reading a review of the methods of comminution, ball mills, roll mills, colloid mills, etc, as comprehensive as the present book, one cannot help being impressed by the amount of systematic work which still remains to be done before comminution is as well understood as some other unit operations in chemical engineering.

The book may be unreservedly recommended for chemists having to work with aqueous or nonaqueous colloidal dispersions.

NEWS



W F Lauer

• W F Lauer Retires After 34 Years with Ciba

W F Lauer, a key figure in the representation of Ciba dyestuffs, auxiliary products and services in the New York Metropolitan Area, retired on July 1st after 34 years with that organization.

Mr Lauer, whose 65th birthday occurred on June 15th, started out as a "cub" salesman with Geisenheimer & Company in 1917. He became associated with Ciba Company Inc, successively through the absorption of the Geisenheimer operations with Aniline Dyes and Chemicals Inc, which in turn was integrated with Ciba in 1921.

• Croda Offers Bulk Lanolin Alcohols

Lanolin alcohols (or wool wax alcohols), which are reported to have been available heretofore only in relatively small quantities imported from Europe, are now being offered in bulk quantities by Croda, Inc, 51 Madison Avenue, New York, N Y.

Croda has also announced that they are able to make delivery of a full range of lanolin and lanolin derivatives from domestic production.

• Ample Lab Equipment Production Forecasted by NPA

Ample production of laboratory equipment to meet current and future needs (provided manpower continues sufficient) was forecasted last month by the Laboratory. Apparatus and Supplies Industry Advisory Committee at its first meeting with the National Production Authority.

Production facilities have been greatly expanded since the Korean outbreak, committee members stated, and even greater output could be attained by using additional work shifts.

Although difficulty was reported by some industry representatives in procuring cobalt, nickel, copper, aluminum extrusions, zinc castings and components such as fractional horsepower vacuum pumps, production has not been materially retarded, they said.

NPA officials have advised that essentiality of laboratory apparatus and supplies to defense-supporting industries will be recognized under the Controlled Materials Plan, effective July 1. Production schedules will be authorized and allotments of specified quantities of steel, copper and aluminum will be made. DO (defense order) ratings will also be authorized for such other materials and components as are needed to complete the authorized production.

No limitation order is now under consideration for the laboratory equipment industry, NPA officials told the committee, as greater production of this apparatus is desired.

William Thompson, presiding officer and Assistant Director of NPA's Scientific and Technical Equipment Division, advised the committee that firms making laboratory apparatus should file their CMP 4-B applications promptly, so that NPA may speed its action in alloting controlled materials within the industry.

• 3-Day Reunion Marks PTIAA 50th Anniversary

Philadelphia Textile Institute Alumni were treated to a 3-day program last month marking the Golden Anniversary of that institution's alumni body.

Events began on June 7 with an open house at the school's new site at Schoolhouse Lane & Henry Avenue, Germantown.

On Friday, June 8, the Annual Outing at the Manufacturers' Golf and Country Club, Oreland, Pa attracted over 200 with a program that included the annual meeting at 11:00 A M, an afternoon of golf and other activities, and the Reunion Dinner at 7 P M. The golf tournament was conducted under the Calloway system. The annual softball game between the graduating class and the alumni was cancelled due to inclement weather. The Nelson K Fite Memorial Trophy, an annual presentation, was to have gone to the winning team.

The PTI commencement exercises on Saturday morning rounded out the program with Dr Harry V Masters, president of Albright College, delivering the address.

• Ackley Denies Charges of Ad Expenditure Restriction

Charges that the general manufacturers' pricing regulation (CPR 22) and similar regulations issued by the Office of Price Stabilization for machinery, textiles and shoes, will severely restrict manufacturers' expenditures for advertising were vigorously denounced recently as fallacious by Assistant Director for Economic Policy, Gardner Ackley.

Mr Ackley points out that the general manufacturers' order and subsequent regulations based upon it, provide generally for pre-Korean prices, plus allowances for increases in factory labor and material costs, but do not allow for increases in general administration and advertising costs.

THE CALENDAR OF COMING EVENTS APPEARS ON PAGE 447

• Reid to Receive Chemical Industry Medal

Ernest W Reid, president of the Corn Products Refining Company, New York, N Y, has been chosen to receive the Chemical Industry Medal for 1951, according to an announcement made recently by the American Section of the Society of Chemical Industry, donor of the medal. The medal will be formally presented to Dr Reid at a meeting of the American Section following a dinner in the medalist's honor at the Starlight Roof of the Waldorf Astoria Hotel, New York City, on November 2, 1951.

The Chemical Industry Medal, established in 1933, is awarded annually in recognition of conspicuous services to applied chemistry. Dr Reid was elected to receive the medal by the Executive Committee of the American Section of the Society of Chemical Industry sitting as the committee of award.

Dr Robert C Swain, vice president of the American Cyanamid Company and chairman of the American Section, will preside at the award meeting and Dr Gustavus J Esselen, consulting chemist of Boston and immediate past chairman of the American Section, will present the medal.

• FIT Graduates Hear N Y Mayor

119 graduates of the Fashion Institute of Technology heard Mayor Vincent I Impellitteri pay tribute to "the unique educational program" sponsored jointly by the Fashion Industries and the Board of Education of the City of New York. Following his address, given on June 19th at the school's annual commencement exercises, the mayor presented the 1951 Art and Industry Award to Robert L Huffines, president of Burlington Mills Corporation of New York and Co-chairman of the Textile Advisory Committee. The award is sponsored by the Educational Foundation for the Apparel Industry for distinguished service to the fashion industries.

Mr Impellitteri was introduced by the honorable Maximilian Moss, president of the Board of Education. Max Meyer, chairman of the Board of the Foundation, presided at the exercises.

Gold medals for scholarship and service were presented to graduates Barbara Schultz and Leila Yager by Morris W Haft, chairman of the Executive Committee of the Educational Foundation. Awards for excellence in special fields were presented to Charles Steinberg for design and Paul Berhard for scientific management by Samuel L Deitsch, chairman of the Fashion Coordinating Committee of the Foundation.

• Arnold, Hoffman Expands Cincinnati Production

Arnold, Hoffman and Company, Inc, associated with Imperial Chemical Industries Ltd, London, England, has announced a major increase in the production of their Harkness and Cowing Division, Cincinnati branch plant.

Expanded facilities for distillation production, as well as facilities for production of fatty acid esters, amides, plasticizers and substantive softeners are now in operation.

• LTI Inaugurates ROTC Courses

July 1st marked the inauguration of a recently-obtained Air Force Reserve Officers Training Corps program at Lowell Textile Institute, to be activated with the commencement of classes in September. Further applications will be accepted until August 1, it is announced.

Information as to entrance requirements, course content, etc, may be secured by writing to the Institute at Lowell, Mass.

• NBTI Graduates 56

Fifty-six students were awarded Bachelor of Science Degrees at the fifty-first Commencement of the New Bedford Textile Institute in June. Of the awards, thirty-seven were in the field of Textile Chemistry, ten in Textile Engineering, and nine in Machine Design. Eight additional students receved certificates in Textile Technology or Drafting and Machine Shop Practice.

Following the invocation by Rev William J McMahon, Professor J E Foster, Head of Engineering Department, presented the candidates for the Engineering Degrees to President George Walker who prsented the diplomas to the graduates. In a succeeding similar ceremony, Professor Francis Tripp presented the candidates for the Textile Chemistry Degrees. The presentation of the certificate completed this portion of the program.

The presentation of the following awards of merit were made to the graduates:

The National Association of Cotton Manufacturers' Medal: To John J Gajda by William F Sullivan, president of this association.

The NBTI Alumni Asscoiation's Fred E Busby Textile Chemistry Award: To Anibal L Ferreira by James Pilkington.

The NBTI Alumni Association Samuel Holt Designing Award: To Lawrence C Legere by William Richards.

The Phi Psi Fraternity Award: To Raymond F Haworth by Richard A Gifford.

Chairman John A Shea of the Board of Trustees made the opening address of welcome and introduced the several speakers of the evening, among whom were Mayor Arthur N Harriman of New Bedford, Commissioner of Education John J Desmond, Jr, Business Agent George H Barney of the Massachusetts Department of Education, and President Walker.

The baccalaureate address was given by Judge August C Taveira.

• Williams Directs Textile Conference Series

A series of textile conferences sponsored by the Textile Committee on Public Relations has been inaugurated in various sections of the country this summer under the direction of Simon Williams, Director of Technical Information of Fabric Research Laboratories, Boston. The conferences are designed to provide factual and useful information about textiles and the textile industry to consumers, manufacturers, retailers, sales personnel, producers of raw materials, dry cleaners and launderers, students and educators. Mr Williams' programs include discussion classes, demonstrations and exhibits.

First of the conferences was held June 25-29 at Fitchburg State Teachers College, Fitchburg, Massachusetts. Participating in this conference, co-sponsored by Massachusetts State Department of Education, Division of Distributive Education, were regional supervisors from all parts of Massachusetts who direct distributive education programs in their areas. Mr Williams discussed problems related to getting textile products to the ultimate consumer.

The second conference co-sponsored by the University of Utah, Department of Home Economics, was held July 5th and 6th at Salt Lake City, as part of a summer course given by the University's Home Economics Department.

The third conference, beginning July 16th will be held under the co-sponsorship of the Seattle Public Schools System, Distributive Education Division. In the Seattle area, Mr Williams will give lectures in the retail stores to store personnel, sales people, buyers, department heads, and other executive personnel. Here, too, public lectures are planned and special lectures will be given evenings to launderers, dry cleaners, local garment manufacturers, and the like. Lecturing in the stores, Mr Williams will take textiles from current stock on the shelves of the stores to illustrate merchandising problems and offer basic suggestions for their solution.

For the balance of the summer, Mr Williams will schedule additional conferences under the committee's sponsorship, radio broadcasts and talks before civic groups in other sections of the Northwest.

• Eugene F Bertrand Addresses DCAT

The newly appointed Assistant Administrator of the Defense Production Administration, Eugene F Bertrand, addressed the Drug, Chemical and Allied Trades Section of the New York Board of Trade (DCAT) at its Spring Luncheon Meeting on June 12 at the Hotel Astor. His topic was "What Defense Mobilization Means to American Business." Mr Bertrand is on leave from Owens-Illinois Glass Company, where he is Drug Industries Sales Manager.

C P Walker, Jr (Chas Pfizer & Co, Inc), Chairman of the DCAT, presided. Charles M Macauley introduced the speaker.

• Hot-Oil Process Gaining Wide Acceptance

General Dyestuff Corporation's Hot-oil bath process for continuous dyeing of cotton and rayon textiles is reported to have gained acceptance in the industry to the extent that nearly 20,000,000 yards of cloth produced under the method have been placed in the market. J Robert Bonnar, GDC technical director, reports that 12 mills have converted to the method.

Details of the process were recently reviewed by S H Williams in a talk before the New York Section, AATCC. Mr Williams' paper and subsequent discussion will appear as a full article in the DYESTUFF REPORTER shortly.

The process, which was introduced to the mills by members of the General Dyestuff research staff, is said to have resulted in economies, both in savings in the reduction of waste with high quality and expensive dyes, and also in time consumed. The process makes possible the dyeing of regular piece goods material, three feet wide, at a reported rate of more than one hundred yards a minute, compared to about 75 yards under the old water use method.

Several of the mills are reported to have successfully applied the process in the dyeing of a variety of difficult shades and cloth fibers, including work clothing, shirtings, twills, jeans, sheetings, corduroys, poplins, sateens, toweling, oxfords and prints. Mr Bonnar has stated that the process has been found applicable to all classes and types of vat sulfur and direct colors.

• Kime Reviews Late SRRL Findings

James A Kime of the Southern Regional Research Laboratory, reviewing work of the SRRL in a talk before the Textiles and Clothing Division of the American Home Economics Association meeting in Cleveland last month, explained the carboxymethyl cellulose process for producing cotton thread of good dry strength for use as basting thread or supporting yarn in fabric manufacture. The thread, which is similar to alginate or seaweed fiber developed in England, dissolves when put into water or a weak soap solution.

Other findings of the Laboratory reported upon by Mr Kime included the treatment of cotton by the partially acetylated cellulose process, which is said to make it many times more resistant to heat and rot than untreated cotton. He pointed out that covers for ironing boards and pressing machines so processed last 4 or 5 times as long as untreated covers. Originally developed in a search for mildew-resistance, the process also permits a fabric of much lighter weight.

• NBTI Alumni Hold Annual Weekend

Open House at the New Bedford Textile Institute and a Blind Bogey Tournament at the Paskamansett Golf Club were the initial activities of the New Bedford Textile Institute Alumni weekend on June 1.

The annual business meeting was held at the New Bedford Hotel on Saturday morning. The establishment of the William R Chase Trophy was voted at this meeting as a tribute to Mr Chase, the sole surviving competitor in the original basketball game played at Springfield College and a rabid supporter of NBTI sports activities.

The following officers were elected for the 1951-52 year:

President—George Hotte, A M Tenney Associates, New York.

Area Vice Presidents—New Bedford: Henry Taylor, Aerovox Corporation. Boston: Siegfried Carlson, Boston Elevated Co. Providence: William Clarke, Arnold Hoffman Company. New York: Cameron Baker, U S Testing Company.

Secretary—James L Giblin, New Bedford Textile Institute.

Treasurer—Francis Tripp, New Bedford Textile Institute.

The annual clambake was held Saturday afternoon at Dan's Pavilion-by-the-Sea, New Bedford. More than two hundred alumni and friends heard Attorney Felix F Perone of the NBTI Citizens Committee outline the building plans for the Institute and were presented the members of the committee who were present. The other speakers included retiring Alumni President Harold B Sturtevant, Alumni President-elect Hotte and Institute President Walker.

Mr Chase, who is very active for his eighty-five years, made the presentation of the first William R Chase Trophy to Raymond F Haworth.

NAMES IN THE NEWS

• Rodney Hunt Names New Regional Sales Engineer

Rodney Hunt Machine Co has announced the appointment of LAWRENCE B HUNT to succeed L M PHILLIPS as sales engineer in New England and New York State. Mr Phillips has accepted administrative responsibilities in the home office.

Mr Hunt has for the past 13 years handled sales and service in New England for a manufacturer of large stainless steel machinery. Following a training course at the Orange plant, Mr Hunt is now servicing Rodney Hunt customers in his territory.

L B Hunt

• Heyden Appoints Schrader to Managerial Post

Heyden Chemical Corporation has appointed LLOYD L SCHRADER manager of their Industrial Relations Department, with headquarters at the Garfield, New Jersey, Division.

Mr Schrader was superintendent of Personnel and Industrial Relations at the Morgantown Ordnance Works from July 1, 1946 until May 15, 1951. He was previously employed by the Calco Chemical Division of American Cyanamid Company and the Great Lakes Steel Company.

V W Colby

• Colby Promoted by Emery

Emery Industries, Inc, has announced the promotion of VERNON W COLBY to assistant chemical sales manager supplementing the activities of ROBERT T HULL, also an assistant chemical sales manager, and ROBERT F BROWN, chemical sales manager.

Mr Colby became associated with Emery Industries in a sales capacity. Prior to his recent appointment, he had been servicing the territory composed of Connecticut, Rhode Island and Eastern New York State.

• Berry Joins Aries

Howard Berry, formerly vice president, treasurer and director of Mathieson Chemical Corporation, has joined R S Aries & Associates, New York consulting engineers and economists, as senior associate.

Mr Berry has completed 28 years with Mathieson in an executive financial capacity, first as vice president and comptroller and in later years as vice president and treasurer. His early years were spent as comptroller for the Remington Arms Co, as General Auditor of the American International Corporation, and in public accounting.

Howard Berry

• Wynn Named Sandoz Head

JAMES O WYNN, a member of the board at Sandoz Chemical Works, Inc, for more than 10 years, has been elected president of that organization, succeeding the late Ernest D Gossweiler, founder of Sandoz in this country in 1919.

Mr Wynn, an attorney, is also a director of the Cincinnati Chemical Works, Inc.

• Fleming Appointed Proctor & Schwartz V-P

MYRON T FLEMING has recently been named vice president in charge of sales and engineering for the Dryer Division of Proctor & Schwartz, Inc, succeeding George W O'Keefe who held that post until his death in February of this year.

Mr Fleming, sales manager of the company since early 1950, has been associated with Proctor & Schwartz since 1935.

Myron T Fleming

• Mohr Named Quality Manager

Transfer of J GILBERT MOHR from the glass technology section of the research division of Libby-Owens-Ford Glass Company to become quality control manager of the new Fiber Glass Division in Parkersburg, W Va, was announced last month by G P MacNICHOL, JR, vice president. Plans to begin manufacture of fiber glass in Parkersburg were announced in March and since that time construction work has been under way to convert the former Vitrolite plant to make the new product.

Mr Mohr has been with Libbey-Owens-Ford in Toledo for nearly four years and prior to that with Corning Glass as a research physicist, and in ceramics color technology work with du Pont at Perth Amboy, N J.

In his new duties he will be closely associated with DONALD L McCLURE, plant manager, at Parkersburg.

D D Gagliardi

• Gagliardi Becomes Director of Product Development

Ernest Nathan, President of the Warwick Chemical Company, Division of Sun Chemical Corporation, has announced the appointment of DONALD D GAGLIARDI as Director of Product Development.

Mr Gagliardi was Research Associate of the Textile Foundation Laboratories from 1942 to 1944. He served as Senior Chemist for the National Bureau of Standards from 1945 to 1946 and was Section Leader, Rohm and Haas Company Central Research Laboratories, 1946 to 1951.

• H C Speel

HENRY C SPEEL has been appointed director of the development department of Wyandotte Chemicals Corporation, Wyandotte, Michigan. Formerly with General Dyestuff Corporation, Mr Speel has had extensive experience in market research and market development work over the last 20 years with Atlas Powder Company, General Mills, Inc, Alrose Chemical Company and General Aniline and Film Corporation. He will direct all phases of market development and technical service for Wyandotte Chemicals' new organic products.

Henry C Speel

Dr P O Powers

• Powers Named PICC Chemical Director

DR PAUL O POWERS has been named Chemical Director of Pennsylvania Industrial Chemical Corporation, Clairton, Pa. Formerly Technical Advisor to Battelle Memorial Institute, Dr Powers will be concerned with cordinating research activities, technical service, chemical laboratory work and pilot plant operations in the development and maintenance of synthetic resins, solvents, oils and other Picco products. He also will continue to serve as an advisor to the National Research Council on Quartermaster problems.

• du Pont Personnel Shifts

Several important shifts in du Pont personnel have taken place over the past few weeks.

In the rayon department MANFRED KELLER, for the past eight years special assistant to Robert L Richards, general manager, has been appointed manager of a newly established service section of the department's planning division. Matters formerly handled by Mr Keller, as special assistant, have now been made the responsibility of the planning division.

In other Rayon Department personnel shifts WALTER C EBERLIN, assistant director, acetate research section, The Benger Laboratory, Waynesboro, Va, and ALLAN A WIGGINS, JR, sales development specialist, acetate sales, Wilmington, were transferred to the planning division, the former as manager of the engineering section; and DR FREDERICK R MILLHISER, technical superintendent, Waynesboro rayon plant, was promoted to assistant director in charge of "Orlon" acrylic fiber research at The Benger Laboratory.

On June 4, DR COLE COOLIDGE was appointed director of du Pont's Chemical Department. He succeeds DR ELMER K BOLTON, who retired on June 30 after 21 years with the company. Dr Coolidge has been assistant director of the department since 1939.

DR GEORGE E HOLBROOK, manager of the plant development section of the Organic Chemicals Department, has been named assistant director of the company's Development Department. He was appointed by HENRY E FORD, who became department director on June 1, stepping up from assistant director with the retirement of DR ERNEST K GLADDING. WILLIAM A BOURS III succeeds Dr Holbrook.

• New Glyco V-P

DR EUGENE McCAULIFF has been elected vice-president in charge of sales of the Glyco Products Co, Inc, Brooklyn, N Y. He has been in charge of technical service and development since 1944. Prior to this he was connected with the Hooker Electrochemical Co and Industrial Synthetics Corp.

Dr E McCauliff

• Hooker Appointments

Recent appointments at the Hooker Electrochemical Company have been announced as follows, by departments:

Development & Research Dept—MADHAV R BHAGWAT, formerly of H K Ferguson Company, employed as research chemist. JACK S NEWCOMER, formerly with Sharples Chemicals, employed as chemist. MARGERY HACKWELL, formerly of Texaco Development Corporation, employed as a librarian.

Engineering Dept—ALLAN P WALKER, formerly with E I du Pont de Nemours & Company, Inc, employed as a design engineer. ADAM C PEBRINKIS, recently with Delco Appliance Div, General Motors Corp, employed as a chemical engineer.

Process Study Dept—KENNETH A GENDRON, formerly of G F Wertime, Inc; WALTER T GEORGE, formerly with Brown-Lipe-Chapin-General Motors Corp, both employed as chemical engineers. Recent college graduates also employed as chemical engineers are ERNEST F BLEW, ROBERT E GUSTAFSON and JOHN L SENFT.

• ICI Wool Dyeing Specialist Visits U S

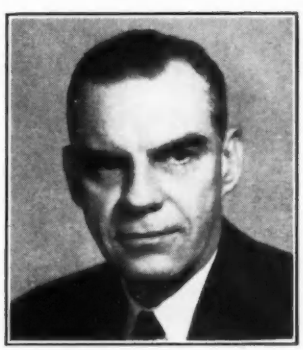
REGINALD SENNETT, a wool dyeing technician from the Dyestuffs Division, Imperial Chemical Industries Ltd of London, England, recently completed a visit to the U S.

During his visit with Arnold, Hoffman and Co, Inc, associated with ICI, Mr Sennett visited a number of plants in the company of Arnold, Hoffman salesmen. On May 18 he addressed a meeting of the Northern New England Section, AATCC, held at the Andover Country Club, Andover, Mass.

• New GAF Officers

At the June meeting of the Board of Directors of General Aniline & Film Corporation, FRANCIS A GIBBONS and C JOSEPH HYLAND were elected Treasurer and Secretary, respectively.

Mr Gibbons, Secretary of the Corporation for the past ten years, joined General Aniline in 1929. Mr Hyland, formerly connected with the law firm of Lerman & Hyland, joined the Company in 1942 and has served since 1944 as Director of GAF's Public Relations.



Francis A Gibbons

C Joseph Hyland

NEW PRODUCTS AND DEVELOPMENTS

• Dexter Develops Nylon Antistatic

A new synthetic organic compound of high affinity for nylon has been developed by the Dexter Chemical Company, Boulevard P O Box 1, New York 59, N Y, as an answer to the electrostatic problem usually encountered in the spinning and processing of nylon. The product, Dextrol Lektrostat B, reportedly can be added either to the dye bath or to a separate bath after dyeing. Application by the usual padding operation is also permissable, according to the manufacturer. Actual plant runs are reported to have shown that 1-3% of the agent on the weight of the goods will provide satisfactory results.

Dextrol Lextrostat B is said to be readily soluble in water, slightly alkaline in reaction, and completely compatible with anionic agents under normal processing conditions. Other characteristics of the product include a resistance to dry cleaning and washing, a softening effect upon nylon fibers, and a lack of adverse effects upon lightfastness of colors.

• Pressure-Sensitive Labeling Tape

Labelon Tape, a new pressure-sensitive labeling product, is now available in four colors and four widths from the Labelon Tape Company, 100 Anderson Avenue, Rochester 7, N Y. Made of two layers of acetate with a white waxy substance laminated in between, Labelon derives its writing qualities from the pressure of the pencil or stylus on the tape. Pressure on the top clear layer destroys the white waxy substance and exposes the bottom colored layer to view, somewhat on the order of the children's "magic slate" toy.

The neoprene-base adhesive, which requires no moistening, is said to adhere readily to almost any clean surface. Further, the water-proof, oil-proof, smudge-proof, acid-resistant tape can be transferred from one surface to another repeatedly without leaving a sticky residue or destroying the adhesive qualities, the manufacturer states.

Labelon is made from nonhygroscopic acetate and, reportedly, will not turn yellow with age, discolor, or curl up at the edges. Recommended temperatures for its use range from —40° to 150°F.

• Carter-Set Process

Culminating two years' experimentation and four years' research, a new shrink control process has been developed by engineers of the William Carter Company and the Tubular Textile Machinery Corporation. Carter's mill facilities have been adapted to permit full use of the process on all their cotton garments.

No chemicals are used, the process employing controlled heat and humidity and constant monitoring of each step in product manufacture. Shrinkage is reported reduced by 50% on some fabrics, and, where shrinkage had been exceptionally high, as much as 75%.

Leo J Feuer, Carter development engineer, states that the process is not "prohibitively expensive, the original equipment cost being lower than in any other existing preshrinking process." Operating costs are slightly higher than in older methods, however. The machinery is patented under the name of Tube-Tex.

Controlled tension, which limits the stretch of the wet, bleached fabric as it is spread to specified width on the Tube-Tex wet-spreading, extracting and processing machine prior to drying, is a basic element in the initial step in manufacture. Following this there are ten exclusive "Carter-developed" steps.

Drying is done under the same controlled conditions at low, constant heat. The fabric, once dried, is conditioned in temperature- and humidity-controlled rooms in an effort to insure the relaxed loop structure.

Preshrinking on the Tube-Tex tensionless calendering machine requires further control, provided by propellor-type spreaders that can be regulated to meet standards of measurement developed in the control laboratory. The humidity required for this step is provided by inducing steam through the fabric by high-speed jets.

Laying out the fabric, prior to the cutting operation, is said to be rigorously supervised to maintain desired looseness of fabric structure.

All findings, stay fabrics, and other trims will be Sanforized if woven and Carter-Set if knit and all stitching will be tension controlled to insure uniform dimensions in both seams and fabrics, it is stated.

• Hoffman Improves Scouring and Depainting Process

Decisive improvements are reported to have been worked out in the Hoffman process* for scouring and depainting wool to further accentuate mechanical action in the solvent and thereby aid in the removal of water solubles and the remaining, degreased impurities along with the grease.

It is claimed that no felting occurs during the process, and that, now, the absence of conglomerates of fiber bundles results in an increase of yield on tops (in many cases up to 5%).

Originally a strong crushing and scrubbing action under solvent spray was attained in the process, the superimposed rollers of the system producing alternating soaking in fresh solvent by counter flow and squeezing. Now new continuous flusher attachments have been inserted between the roller units to rearrange the layer of the fibers in such a way that the broken-up and crushed particles are flushed off in less space and time. The flushing action reportedly can be increased by an accelerator, which is of particular help in the removal of suint.

The recent invention of a continuous centrifuge, plus the surface tension of Fialasol type solvents employed in the process have now made it possible to extract the squeezed wool after the degreasing and flushing-out within the solvent is done. If the stock is sufficiently free of excess solvent, it is, at that point ready to proceed into the cards. Production per hour in the centrifuge is said to be 600-1,000 pounds and (on painted noils) more. Electrical control switches are employed to automatically shut down both centrifuge and preceding equipment if "plugging" occurs.

The dirty solvent can be filtered continously and distilled under vacuum. Residues after distillation can be burned off in oil burners, avoiding stream pollution.

With the combination of the scouring, depainting and rinsing into one operation the tendency of long and/or fine wools to crimp is largely avoided.

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* The inventor of the machine used in this process, Manfred T Hoffman, is an expert in continuous dry processes for the elimination of grease, paint, tar and vegetable matter in wool fibers. As a consultant for the felt, textile and hat trades, he maintains offices at 187 High Street, Newburyport, Mass.

• Dyeing Assistant for Dacron

Amalgamated Chemical Corporation, Philadelphia, Pa, has developed a new dyeing assistant, "Amidye," which is said to give deeper, richer shades to Dacron yarns, knit goods and woven fabrics. The new assistant is a solution of sodium salt of a complex phenol combined with "suitable" active agents. It is said to thoroughly exhaust the dyestuffs.

Hillary Robinette, Jr, Amalgamated's research director reports that no difficulty has been experienced in obtaining excellent wet and dry crock-fastness and extreme depth of shade. He has stated "experiments with Amidye, originally called Experimental 349, produced excellent results on maroon, cordovan and navy sweaters and socks where lustrous shades are so important".

The manufacturer states that Amidye can be used with any method of dyeing and has been used successfully in the commercial dyeing of Dacron in various forms —on men's hose in rotary machines, on sweaters in paddle machines, in package, skein and piece goods dyeing.

• Fiber E in Limited Production

Fiber E, a new type of viscose process rayon that is said to possess striking properties of curling or crinkling into a fuzzy, wool-like fiber when treated with a dilute solution of caustic soda, is now in commercial production at du Pont's Old Hickory, Tenn plant, according to company reports.

This "new" fiber of regenerated cellulose is reportedly indistinguishable to the eye from the conventional viscose yarn and also similar chemically; physical properties set the two apart, however.

When combined with yarns of other fibers, Fiber E imparts a carved effect to cut, brushed, and loop-pile fabrics and will produce a two-tone color effect from a single dye bath, according to reports.

There is no crimp in the yarn as shipped by du Pont, but the property to take a crimp has been built into the yarn through spinning techniques and a combination of chemicals in the bath that coagulates the viscose solution into a fiber. The yarn is crimped in the customer's mill by a brief soaking in a dilute solution of caustic soda, which changes it from a straight, smooth yarn into a curly one. It can be treated either as yarn before processing or after being knitted or woven into fabric. When the caustic is removed by washing, the fabric is ready for dyeing and finishing.

Fabric designers are said to be employing Fiber E alone and in combination with regular viscose process rayon and cotton to get new color and surface contrasts.

Outstanding properties of the new product are its durability and high abrasion resistance. Tests of the latter property have been conducted by the Massachusetts Mohair Plush Company.

• New Rinsibility Test

Offering a means for verifying by measurements the assumption that synthetic detergents aid in the rinsing process, Dr W A Fessler of the Nitrogen Laboratory, Solvay Process Division, Allied Chemical & Dye Corporation recently outlined a testing procedure to determine rinsibility of synthetic detergents.

Speaking before the ASTM, Dr Fessler pointed out that the test will detect the presence of synthetic detergents when they are mixed with inorganic alkalies, such as sodium carbonates, sodium phosphates, CMC, etc. In the method, aqueous solutions of synthetic detergents can be titrated with surface-active ions of opposite charge where the end point is marked by a sudden migration of a bromphenol blue complex to a layer of chloroform in the test solution.

Full details of the method are contained in a report available upon request to the Solvay Process Division, 40 Rector St, New York, N Y.

• Machine Sets Nylon Tricot at 16 ypm

A nylon setting machine, which is said to permanently set nylon tricot fabric at a continuous rate of 16 yards or more per minute, has been developed by the McCreary Machine Works, Inc, Cohoes, N Y, with the assistance of the General Electric Company's Industrial Heating Division.

Designed for installation on existing tenter frames, the new machine consists of aluminum reflector units which house G-E Calrod tubular heaters. Automatic temperature control is provided by G-E Reactrol, an electronic temperature control unit which reportedly allows automatic stepless heat adjustment through thermocouples located in the reflector frames. Higher speeds can be accomplished by additional reflector units.

John McCreary, president of the Cohoes firm, points out that dyeing can be done either before or after setting, and that the radiant heat method is continuous instead of batch. Since the material is set while still on the frame, accuracy of dimension is reported excellent.

Mr McCreary states that radiant heat setting requires only five steps, the width of the set fabric remaining constant. The machine is electrically coordinated with the tenter drive to make the operation automatic. To prevent scorching, the reflector frames automatically raise if flow of fabric through the tenter stops.

According to Mr McCreary, the new machine was designed with sufficient temperature range to treat other synthetics, e g, Dacron and Orlon. He has estimated operating costs to be less than $1.00 per hour.

• Enley "Demon Demineralizer"

For small quantity users of chemically pure water, Enley Products, Inc., 254 Pearl St, New York 38, N Y, has developed the Demon Demineralizer, a unit whereby the user can produce up to 120 gallons per cartridge, equivalent to triple distilled water, by attachment to the regular water tap.

The "Demon" utilizes a replaceable plastic cartridge, the Amberlite * resins in which change color as they become exhausted. Metallic and other ionic solids are removed from solution by the mixture of anion and cation exchangers; Fiberglas filters help trap physical impurities. The manufacturer states that the instrument can reduce even high concentrations of dissolved salts to less than .01 per million.

The listed price is $14.95, F O B New York. The replaceable cartridges are also available at $5.50 each, with a $1.00 credit allowed for each exhausted cartridge.

* Trade mark, Reg U S Pat Off of the Rohm & Haas Co.

The "Demon Demineralizer"

• Three New GDC Colors

General Dyestuff Corporation, 435 Hudson St, New York 14, N Y, has released details of three of their latest products:

ACID ALIZARINE BROWN RLL—a straight, acid dyestuff, developed primarily for fast-color work on wool, nylon and silk. It is reported to have excellent fastness to light, even in pale shades, and good to very good wet fastness. GDC states that it is especially useful in combination with chrome colors since chrome improves the wet fastness of this dye considerably on wool without impairing the shade. It's usefulness is increased with a reported excellence in dischargeability on wool, silk and nylon. (Circular G-678)

BENZO FAST COPPER BROWN BRL—a straight, "noncompetitive", dischargeable, direct dyestuff for the production of fast shades on cotton, linen, rayon, and silk. GDC states that an aftertreatment with copper salt is essential for the development of the normal shade and fastness properties of dyeings of this product. (Circular G-679).

ALGOSOL RED VIOLET IRRN—a newly developed, water-soluble, leuco ester of the straight indigoid vat dye, Indanthrene Red Violet RRNA. For cellulosic fibers, this Algosol reportedly finds its principal use in printing, where its brightness, high tinctorial value and excellent wet fastness are more important than its light fastness, which is said to be good (5) for heavy shades and fairly good (4) for light shades. The manufacturer points out that it is also advantageous for those fibers where quality of dyeing is paramount, particularly in continuous work but also in jig dyeing. For wool, this product is said to be the ultimate in fastness properties. Dyeings are reported to be of maximum (8) fastness to light and excellent (5) fastness to washing and fulling, leading GDC to recommend it for animal fibers when best all-round fastness is desired.

• Plastic Film Liners

Blossom Manufacturing Co, Inc, 915 Broadway, New York 10, N Y is currently manufacturing liners of plastic films for drums, boxes, containers and container covers. The liners are said to be strong, durable, water-proof and damp-proof, capable of use regardless of whether the contents are powder, paste, liquids or otherwise.

Blossom also manufactures practically all types of bags and envelopes of the light-weight, acid-resistant plastic film.

• CRL Research Reputedly Making Ad Copywriters Honest

Harold G Shelton, general manager of Antara Products, division of General Dyestuff Corporation, last month declared that "modern chemical research has made honest men out of advertising copywriters". Speaking before a combined meeting of the sales staff of his organization and technical personnel of General Aniline and Film Corporation's Central Research Laboratories in Easton, Pa, Mr Shelton referred specifically to the Antara Brightener products, optical whitening agents of high activity. He told the group that CRL's research on the colorless, fluorescent, direct "dyestuffs" has made it possible for soap companies to claim "beyond a doubt" that their new "improved" products actually "make white fabrics whiter" and "colored fabrics brighter."

Like the more common colored agents of their class, the brighteners are said to exhibit high affinity for fabrics, exhausting readily from extremely dilute solutions and spreading evenly. According to Mr Shelton, these brighteners are stable to the common soap and detergent builders such as alkalies, starch and carboxy methyl cellulose.

Most all substances absorb light, usually at characteristic wave-length ranges, and many, such as the brighteners, emit this absorbed energy in the form of visible radiation. Brighteners, being inherently colorless, reportedly show no absorption in the visible region of the spectrum but absorb highly, however, in the near ultra violet. This absorbed energy is emitted as light of longer wavelengths, treated fabrics revealing this emission as visible blue fluorescence—a color said to be capable of masking the normal yellowish cast of most cotton or woolen cloth. Fabrics treated with such fluorescent agents are said to have an increased surface reflectance and, as a result, more brilliancy than untreated fabric. In this respect, Antara points out that their brighteners differ sharply in action from bluing which, although masking yellow coloration, is said to decrease the over-all reflectance of the treated cloth.

According to Mr. Shelton, one of the Antara Brighteners has a light whitening effect on soap, which has contributed to its widespread use, the chief value of brighteners lying in their ability to whiten washed fabric when applied through the medium of soap or detergent.

The brightener may be added to the final detergent product and thoroughly mixed by milling or tumbling, or it may be added in the final stages of processing such as in milling, crutching or at a fluid stage prior to spray or drum drying. They are reported to be not excessively affected by the souring and rinsing operations.

• Dynel's Performance as Filter Cloth Reported Superior

Enough evidence has been compiled after nearly a year's actual commercial use to indicate that filter fabric made from dynel rates a "superior" in performance in comparison to other filter materials, particularly in such cases as the presence of hot, concentrated acids in dyestuff and pigment filtration.

Foote Mineral Company, Exton, Pa, is reported to have installed dynel filter cloths for filter pressing of liquors and drum filtering residues in August, 1950 on the basis that it had the longest life per dollar value in pilot plant tests. They report that the cloths have stood up excellently under temperatures from 70-200°F in 25% alkali chloride brines and up to 30% caustic solution within this temperature range. Very little chemical deterioration has been noted to date, and slowdowns from frequent changing have been "virtually eliminated", it is reported.

In the processing of dyestuffs by Wilson Organic Chemicals, Inc, at Sayerville, N J, dynel filter cloths used in plate and frame filter presses are subjected to various acids varying in strength from 10-35%. The dyestuffs are reportedly forced through the filter presses under approximately 30 lbs at room temperature. The most common acid used at Wilson is sulfuric, but salt, hydrochloric acid and miscellaneous organic compounds are also present in the solutions.

Morgan Jones, Wilson plant manager, points out that the dynel filters answer the problems of rapid deterioration and/or sagging. He further points out that dynel does not stretch or shrink, is acid-resistant, and has a "fuzzy" texture which acts as a mat to filter out the finer particles.

Dynel, when cut, is said to act like cotton in the matter of resistance to ravelling. It reportedly will not ravel at the edges when cut with a hot knife and there is less ravelling at the edges than with continuous filament synthetics when holes are cut out for feed ports and wash ports.

One of the observed limitations of the cloths is their lack of resistance to 20% ferric chloride solution at 180°F.

Dynel filter cloths used at Foote Mineral Company and Wilson Organic Chemicals, Inc, are fabricated and distributed by the Filtration Fabrics Division, Filtraton Engineers, Inc, Newark, N J, from dynel fabric designed and woven by the U S Rubber Company.

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CALCONYL* DYES for Printing

With the recent addition of Calconyl Violet B Powder and Calconyl Red B Double and Single Solutions, the

line of Calconyls now presents a wide range of powder and solution types to produce practically any desired shade. These products are especially recommended for economical roller or screen printing of tablecloths, handkerchiefs, towels and similar applications.

As a group the fastness to light is ample for these uses, while the fastness to most other common treatments destructive to color such as washing, perspiration and dry cleaning, is excellent.

These products can be supplemented with Calco Soluble Vat dyes to fill the requirements of the progressive printer.

Your Calco Representative will be glad to supply further information and samples upon request.

*Trade-mark

Chrome Dyes for Military Fabrics

The chrome dyes have long been reliable for the dyeing of woolen military fabrics. They offer extremely good fastness and, at the same time, good controllable dyeing properties. Even though fabrics for special uses may be dyed with other types of dyes, the chrome dyes remain well entrenched for the regular run of fast color fabrics. Some of the Calco line of chrome dyes which may be recommended for these uses are:

Calcochrome* Dyes:

Calcochrome Yellow 2G
Calcochrome Yellow G
Calcochrome Yellow FC
Calcochrome Orange LC
Calcochrome Orange GR
Calcochrome Brown PG
Calcochrome Brown EB
Calcochrome Alizarine Blue Black B

*Trade-mark

Notes on the Operation of Open-Width After-Treatment Ranges

The current scarcity and high cost of chemicals demand that open-width ranges for rinsing, oxidizing and after-treating vat and sulfur dyeings be operated with utmost efficiency. The following points are worth attention:

1. Except for very open weaves or very unevenly surfaced fabrics, hard rolls which are properly crowned will extract liquids most efficiently.

2. The higher the temperature, the greater the extraction effect.

3. The slower the cloth speed, the greater the extraction effect.

4. Elliptical rolls at suitable locations in the treatment boxes greatly promote the interchange of liquor between bath and cloth.

5. Hot water sprays at the nip of wash-box squeeze rolls speed up the removal of surplus chemicals.

6. Well-designed and correctly placed overflows insure the desired countercurrent liquor flow and allow scum to flow away readily.

7. A steam-filled housing enclosing the upper guide rolls of selected boxes accelerates oxidation, soaping and similar treatments.

For the Textile Bookshelf

Reprint of Paper by 1950 Olney Medalist:—A Review of Textile Coloring and Finishing Research by G. L. Royer (Calco Technical Bulletin #818). Covers the important scientific contributions in the dyeing of wool, acetate rayon, nylon and viscose rayon, and the printing and finishing of textiles. Points up the need for increasing cooperation between the dyer and the scientist.

Dying of Wool Stock and Slubbing with Vat Colors (Calco Technical Bulletin No. 819—Supplement to Calco Technical Bulletin No. 797 issued in 1947). This brings the reader up to date on improved dyeing techniques and passes along knowledge derived from extensive mill applications.

Calco used approximately four pounds of 24-carat gold in the maintenance of plant equipment in 1950.

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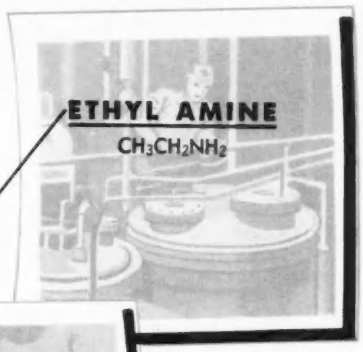

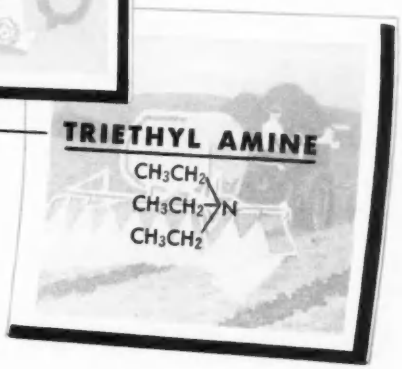

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  - emulsifiers
  - plasticizers
  - dyestuffs
- as a deflocculating agent in manufacture of ceramics.

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  - insecticides
  - pharmaceuticals
  - dyestuffs
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- for solubilizing 2,4-D, a selective herbicide. Only 101 lb. of Triethyl Amine needed to neutralize 221 lb. of 2,4-D.

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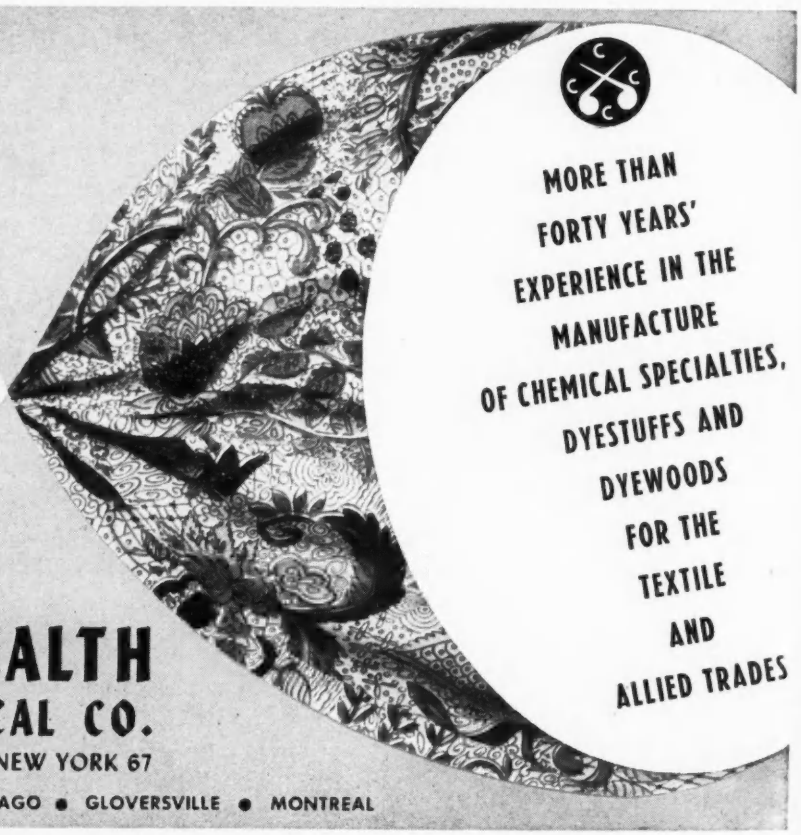

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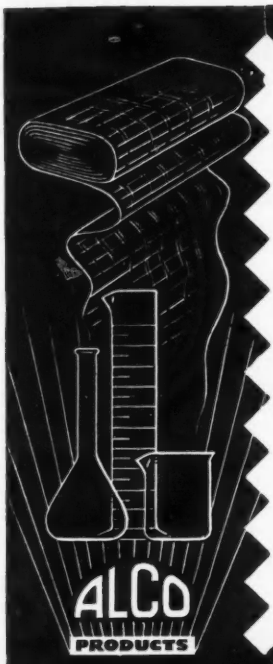

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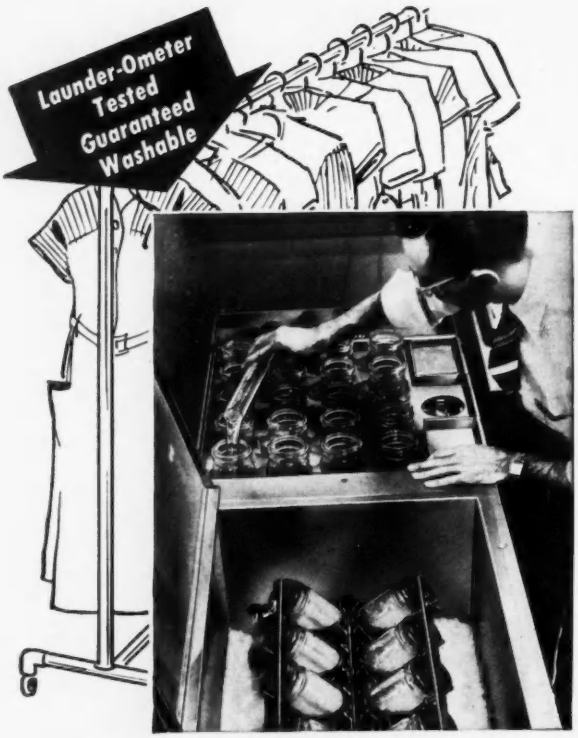

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When it comes to washable fabrics (or any other washable product) the Launder-Ometer is the machine that can give you the facts—in a fraction of the time normally required. Accepted as the standard laboratory washing machine of the American Association of Textile Chemists and Colorists, the Launder-Ometer can duplicate the effects of as many as 5 commercial launderings in one forty-five minute test. The data thus provided includes loss of tensile strength, color fastness, resistance to shrinkage, bleeding, washing and mechanical action, and other equally important information.

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Ambertex M is a ready-to-use concentrated printing gum. Pre-controlled for viscosity and stability. Preparation time: just a few minutes. It deposits a soft pliable film that minimizes splitting of the sheerest fabrics. Deep penetration insures full discharge of the ground color. Razor-sharp detail. And once the job is done, Ambertex M rinses out quickly and easily!

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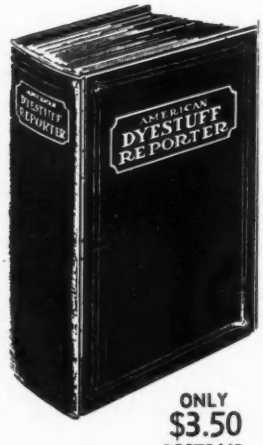

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They completely and permanently soften hardest water *without* precipitation.

- **. . . prevent the formation and deposition of insoluble soaps on textile fibers**
- **. . . remove insolubles *after* they have been deposited**
- **. . . assure cleaner fibers, deeper dye penetration, level dyeing**
- **. . . improve cleaning and foaming action of synthetic detergents**
- **. . . prevent and/or remove iron stains in *any* caustic solution**
- **. . . inactivate and prevent contamination from either divalent or trivalent metals**
- **. . . dissolve natural greases, oils and proteins**
- **. . . prevent oxidation of fats, oils, soaps, fatty acids, organic materials**
- **. . . give *exacting* chemical control over cations in solution.**

All of these things are vitally important to the control of quality and the prevention of spoilage in textiles.

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The four Versenes used in textile processing are powerful organic chelating (complexing) agents. Chemically, they are the sodium salts of ethylene diamine tetra acetic acid and other polyamino acids. Versene (regular) is the most efficient general complexing agent and water softener. *Versene* Fe-3 prevents hard water deposits and iron stains. *Versene* Fe-3 Specific is the most powerful iron complexing agent known in the normal pH range. *Versene T* prevents and removes iron deposits from fabric treated with concentrated caustic. Available in liquid form, Versene T, like all Versenes, remains stable at high temperature and pH. Ask for sample and Technical Bulletin No. 2. Write Dept. E.

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POLYCO dispersions are adaptable to all the common methods for finishing textiles — padding, tumbling, spraying, knife coating and roller coating. The usual methods for drying employed in the textile mill — can, festoon, tenter frame and boarding — can be used for drying treated materials; they will in no way harm the resin finish.

POLYCO emulsions render an improved appearance to printed cotton goods, and good adhesion is possible to natural or synthetic fibers.

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- ★ Completely miscible with water
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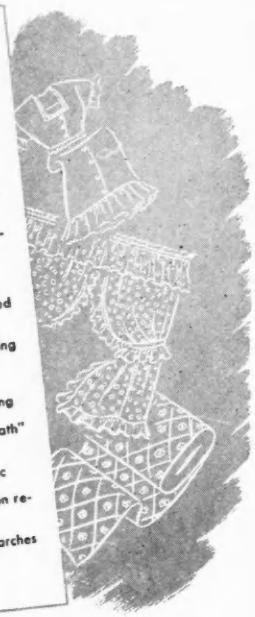
- ★ Improve tensile strength and abrasion resistance
- ★ Pure resins — compatible with starches and gums



Polysize emulsions are offered to textile finishers as tools for compounding finishes to give superior qualities, appearance and handling unattainable with any other materials.

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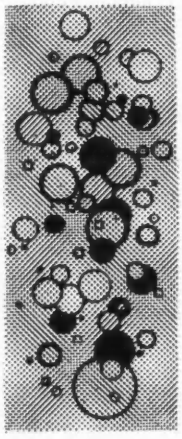

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DYESTUFFS BICK & CO., INC. READING, PA. CHEMICALS

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WANTED: Finisher, especially experienced in resin finishes on spun rayons and blends in medium and heavy suitings. Location New England. Reply in confidence with complete personal details and salary requirements to Box No. 147.

TOP TEXTILE COLORIST—ASSISTANT PLANT MANAGER available for screen or roller print works. 20 years successful experience solving all types of color and production problems, on all kinds of fibers. Excellent color matcher. Desires position with responsibility. Will locate anywhere. Write Box No. 151.

POSITION WANTED: DYESTUFF LABORATORY TECHNICIAN COLOR MATCHER. Thoroughly experienced testing, standardizing and demonstrating all types of dyestuffs on all types of fibers. Thorough print shop and laboratory background. Complete technical knowledge. Write Box No. 152.

WANTED: Technician, textile school graduate—for dyehouse in Paterson, N. J.—acetate, rayon, and nylon. Assistant to the plant manager in charge of processing and development work. Must have a few years dyeing and finishing experience, age limit 35 years, Vet or free of military service. Bright future for right man. State experience, actual salary, etc. Write Box No. 153.

POSITION WANTED—TEXTILE FIELD. 4½ years experience on cottons (overseer of dyeing), 4½ years with a knitting company on hosiery and skein dyeing and 14 years on skein packages, piece goods and long chain dyeing. In the textile trade since 1928. Write Box No. 159.

FOR SALE: 1—54′ x 56″ Pin Tentering Frame with return rolls, manufactured by H. W. Butterworth & Sons. 1—6′ self-sustaining stainless steel dye beck; 50″ depth with rounded front, perforated baffle, idler roll, idler take-off roll, stainless fingers and boom, motor and drive. Write Box No. 158.

POSITION WANTED: CHEMIST-CHEMICAL ENGINEER. Fifteen years comprehensive textile mill experience dyeing, bleaching, scouring, finishing and development research. Laboratory director. Seven years synthetic detergent manufacture and spray drying. Process engineering and trouble-shooting. Desires position as director of research including direction of laboratory. New England preferred. Write Box No. 155.

WANTED: Technically trained and experienced dyer for responsible position with large carpet manufacturer. Familiarity with stock, skein, and package dyeing desired. Must be able to handle wool and synthetic fibers alone or in blends, and have abilities along the lines of dyehouse organization and administration. Write Box No. 156.

POSITION WANTED: Competent full fashioned hosiery dyer, fully experienced. Philadelphia Textile School graduate. Full knowledge of chemicals and finishes. Write Box No. 154.

TECHNICAL SALES SERVICE AND DEVELOPMENT. Large chemical manufacturer developing synthetic fibers wants textile or chemical graduate with minimum 3 years' practical experience dyeing and finishing. State age, education, experience, salary expected. Write Box No. 157.

WANTED: Experienced package dyer for Rhode Island plant. Must be able to assume full charge of production dyeing, using vats, naphthols and wool colors. Only fully qualified man need apply. Replies held in strictest confidence. Write Box No. 160.

WANTED: CHEMISTS. Large internationally known manufacturer of hair treatment preparations, whose main plant is located in Chicago, seeks the permanent services, for its expanding program, of several experienced research chemists in the field of shampoo detergents, wool chemistry and related industries. There is also an opening for an experienced analytical chemist and several well qualified young junior chemists. Please write complete details in the first letter. All information will be kept in strictest confidence. Write Box No. 161.

DYER AND TEXTILE CHEMIST would like to relocate. Twenty years experience in dyeing all fibers with direct, developed, acetate, sulphur, acid, milling, metallized and chrome colors. Experienced on yarns, tops, cut staple and raw stock. Write Box No. 162.

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AN IMPORTANT ANNOUNCEMENT

BY THE OFFICIAL PUBLICATION, A.A.T.C.C. TO MANUFACTURERS OF PRODUCTS USED IN

TEXTILE WET PROCESSING

ISSUED IN CONNECTION WITH THE

Thirtieth Annual Convention

AMERICAN ASSOCIATION of TEXTILE CHEMISTS and COLORISTS

at

Hotel Statler New York

OCTOBER 17-18-19, 1951

The AMERICAN DYESTUFF REPORTER, the only EXCLUSIVELY WET PROCESSING publication will publish the ANNUAL A.A.T.C.C. CONVENTION ISSUE on

OCTOBER 1st, 1951

This issue will be the largest permanent record of textile wet processing development that we have ever published.

The exposition of wet processing machinery and products will also be the largest and most complete of any ever directly sponsored by the A.A.T.C.C.

Advertising copy in this issue should be factual and complete.

A number of exhibitors are now preparing copy for two facing pages to permit the use of both photographs of facilities as well as complete listings of all products available.

Better make *your* reservations!

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ARMOUR Chemical Division

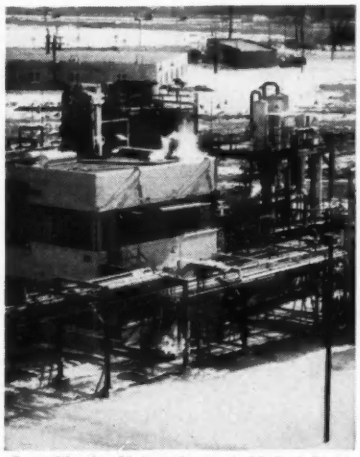
Fatty Acids
Long-Chain Fatty Acid Derivatives
Industrial Oils

Low-Temperature Solvent Crystallized Oleic Acid

Another new product has been added to Armour's line of fatty acids. Already the manufacturer of the most complete line of high-purity distilled fatty acids that can be found anywhere, the Armour Chemical Division now offers low-temperature solvent crystallized oleic acid.

This exclusive process offers users of oleic acid a product that has advantages not found in ordinary distilled or pressed products. The extremely low temperatures employed guarantee a substantially lower saturated acid content than conventional types of oleic acid. In addition, solvent crystallized oleic acids are ester-free materials since the solvent used is not reactive with fatty acids. This new product is characterized by bland odor and has excellent heat stability.

Armour's low-titer White Oleic Acid meets U. S. Pharmacopeia specifications and is recommended for those uses that require a light color as well as a low titer. For textile applications that require a low titer but not a very light color, low-titer Distilled Red Oil is recommended.



Crystallization Unit at Armour's McCook Plant

White Oleic Acid
(Low Titer)

	Min.	Max.
Titer	—	5° C
Iodine No. (Wijs)	90	95
Acid Value	195	201
Saponification Value	195	201
Unsaponifiable	—	2%
Color (Lovibond 5¼" tubes)	—	1.5R - 15Y

Distilled Red Oil
(Low Titer)

	Min.	Max.
Titer	—	5° C
Iodine No. (Wijs)	90	95
Acid Value	193	200
Saponification Value	193	200
Unsaponifiable	—	3%
Color (Lovibond 1¼" tubes)	—	8.0R-30Y

Armour's Oleic Acids are available in 55 gallon drums and aluminum tank cars. Write today for samples and prices.

Armour Chemical Division adds industrial oils to line

The Armour Chemical Division announced recently that it had taken over the supervision and sales of the Armour Industrial Oils Department. This move will greatly improve customer service by making available the facilities of Armour's Research Laboratory and the services of specially trained representatives to discuss customers' problems.

In the textile industry, the complete line of Industrial Oils offers producers of woolens and worsteds a wide selection of special-purpose fibre lubricants. Armour's Industrial Oils have outstanding stability during storage of goods and ready scourability with soap or soda ash.

Included in Armour's line of Industrial Oils for the textile industry are:

Specifications	Prime Lard Oil	Extra Winter Strained	No. 1 Lard Oil
Free Fatty Acid	1-2%	2-4%	15-20%
Pour Point (A.S.T.M.)	40-45°F.	40-45°F.	45-55°F.
N.P.A. Color	2 Max.	2½ Max.	5 Max.
Saponification Number	194-200	194-200	194-200
Iodine Number (Wijs)	70-75	70-75	70-75
SP. GR. 60°/60°F.	0.910 - 0.920	0.910 - 0.920	0.910 - 0.920
Viscosity (S.U. 100°F.)	190 - 210	190 - 210	190 - 210

Arquad 2HT excellent cationic textile softener

Armour's Arquad 2HT is a new cationic softener developed for use in textile finishing plants. It produces a full, soft hand with maximum lubricity and minimum reduction of absorbency.

As a cationic-active softener, Arquad 2HT is substantive to textile materials and can be readily exhausted onto cotton, rayon and wool from a long bath. As a result, Arquad 2HT can be applied most economically in the mill and the full value obtained.

Arquad 2HT is a distearyl dimethyl ammonium chloride. Its outstanding softening properties appear to be due to the presence of the two long fatty chains in the molecule. Arquad 2HT carries a positive charge which is naturally attracted to the negatively charged fabric. This leaves the fatty end exposed to contribute its qualities to the hand of the goods.

Arquad 2HT is compatible with certain finishing agents such as starches, dextrins, glue and gelatin. It can also be applied with most urea-formaldehyde and melamine-formaldehyde resin finishes including the new acid colloid resins.

Arquad 2HT is sold in 75% active concentration . . . packed in specially lined open-head drums holding approximately 400 pounds. Write today for additional information, pound samples, and price quotations.

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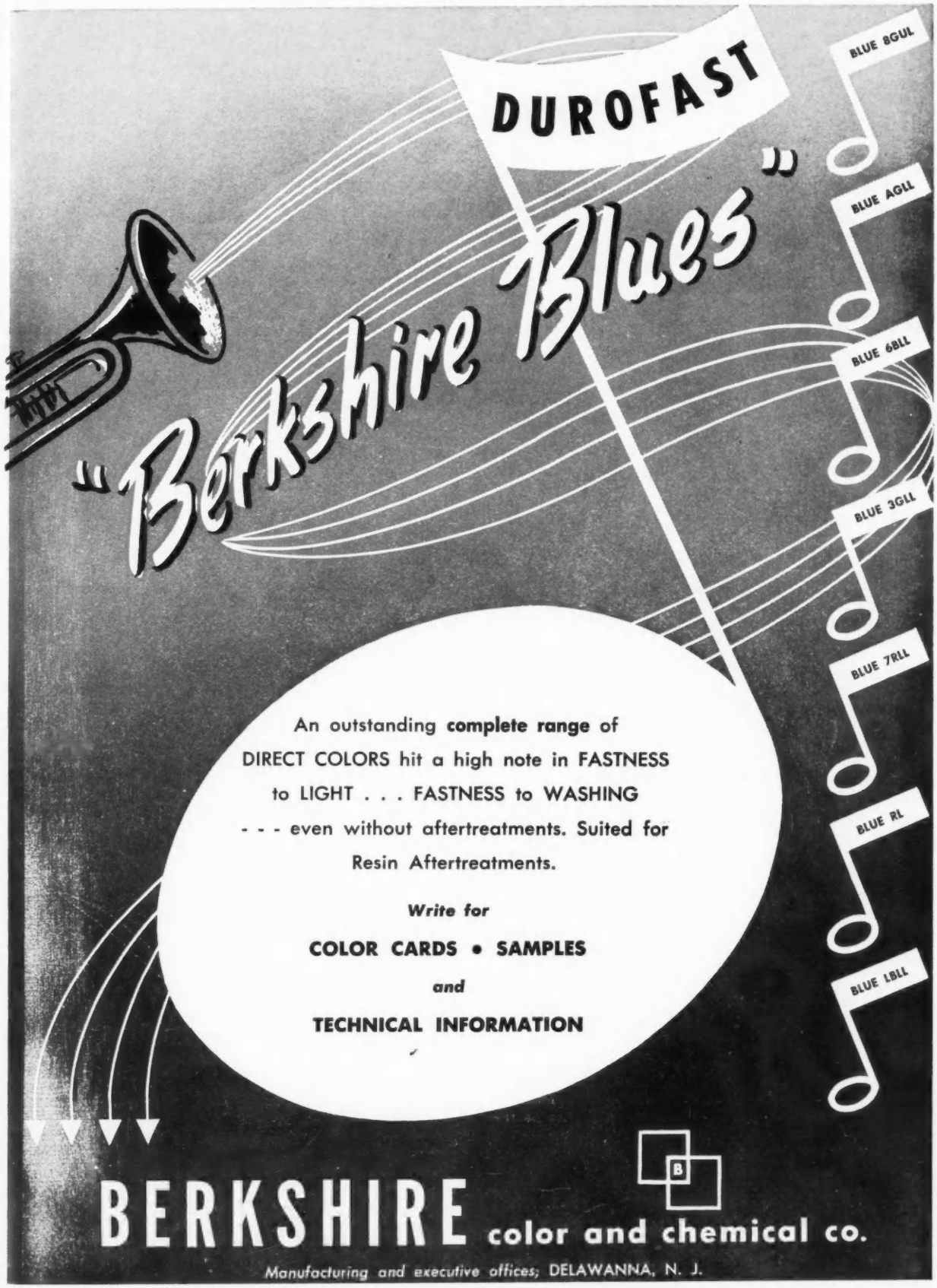
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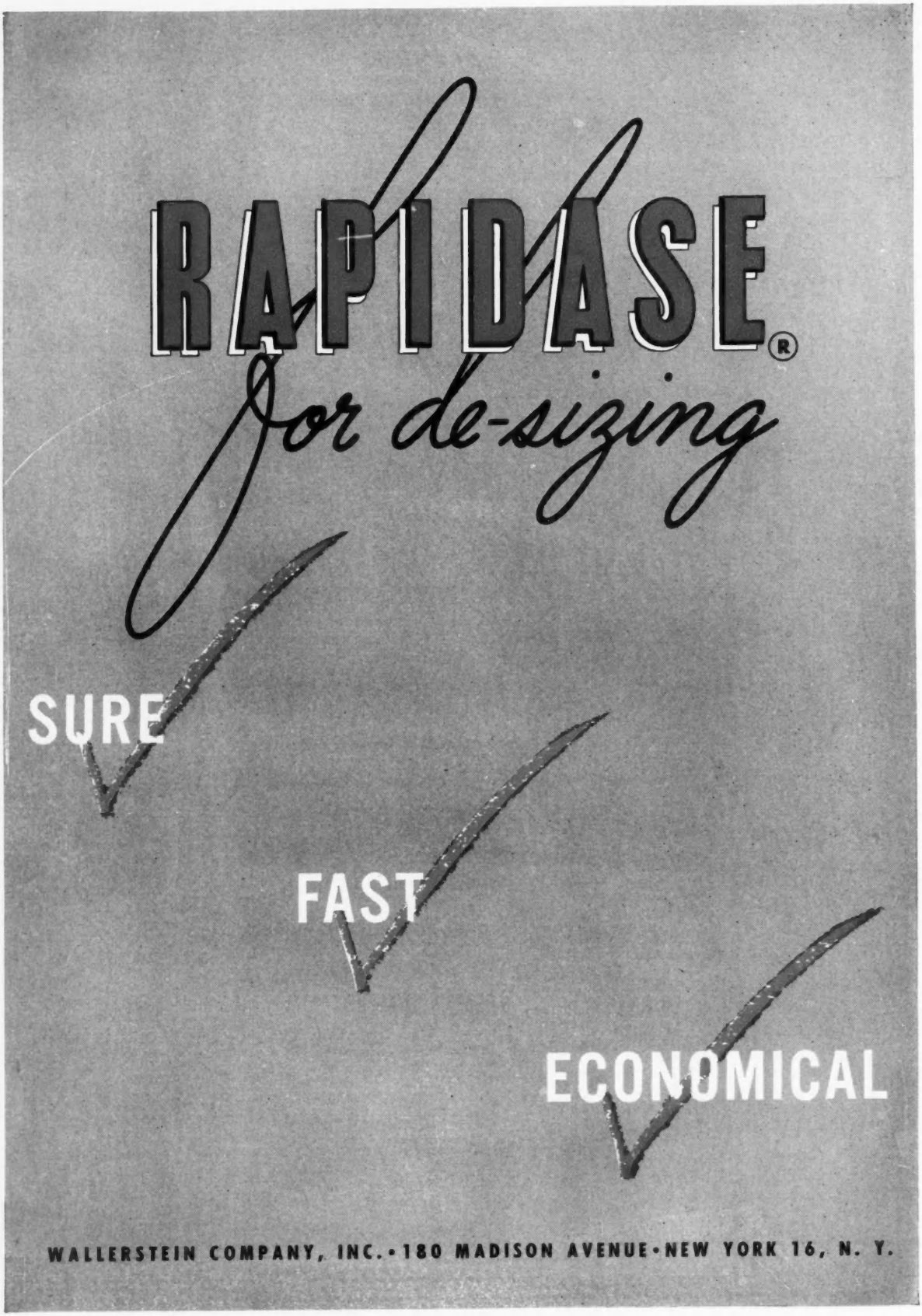
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